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Hornbach et al.

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(54) **COMBINED SIDERAIL AND OVER-BED TABLE**

(75) Inventors: **David W. Hornbach**, Batesville, IN (US); **Richard H. Heimbrock**, Cincinnati, OH (US); **Jonathan D. Turner**, Dillsboro, IN (US); **Stephen Hutchison**, Batesville, IN (US); **Joseph A. Ernst**, Cincinnati, OH (US)

(73) Assignee: **Hill-Rom Services, Inc.**, Batesville, IN (US)

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(51) **Int. Cl.**

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A61G 7/05	(2006.01)
A61G 7/00	(2006.01)

(52) **U.S. Cl.**

CPC ***A61G 7/0507*** (2013.01); *A61G 7/0005* (2013.01); *A61G 2007/0513* (2013.01); *A61G 2007/0514* (2013.01); *A61G 2007/0516* (2013.01)

(58) **Field of Classification Search**

CPC A61G 7/0507; A61G 7/0005; A61G 2007/0513; A61G 2007/0514; A61G 2007/0516

USPC 5/658, 662, 507.1, 503.1, 424, 425, 5/428, 429, 430

See application file for complete search history.

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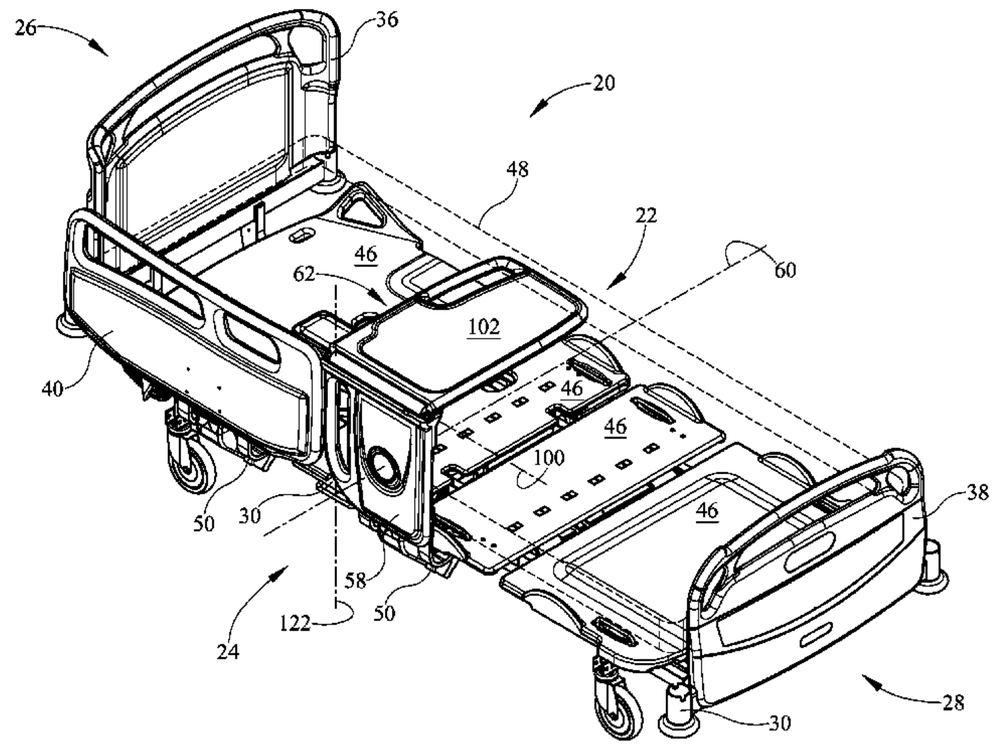
Primary Examiner — David E Sosnowski
(74) *Attorney, Agent, or Firm* — Kenneth C. Baran

(57) **ABSTRACT**

A combined siderail/over-bed table unit **42** for a bed **20** has a table position in which at least part **62** of the unit overlies a mattress region **48** of the bed thereby serving as an over-bed table and also has a siderail position allowing the unit to serve as a siderail.

21 Claims, 23 Drawing Sheets



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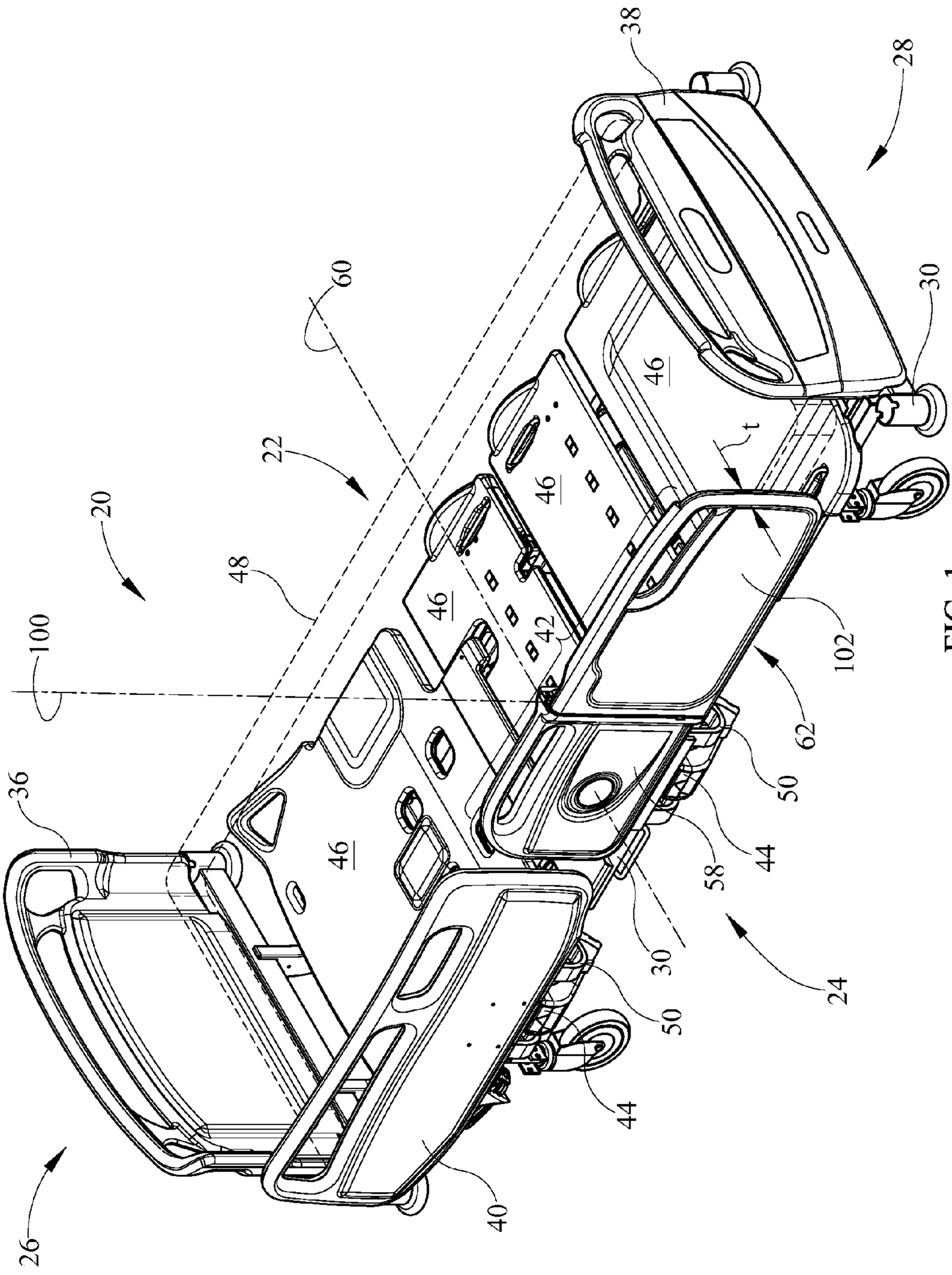

FIG. 1

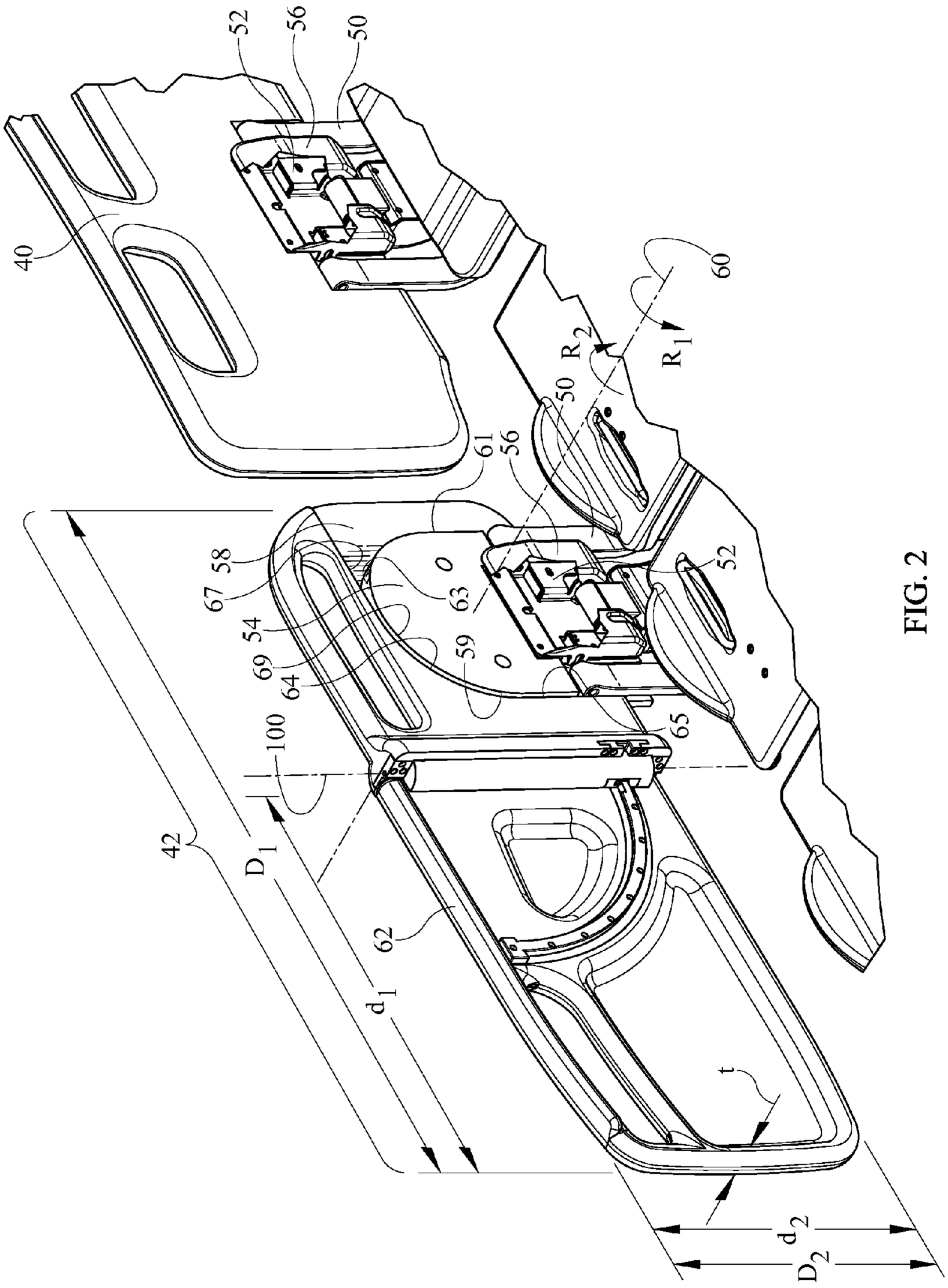
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FIG. 2

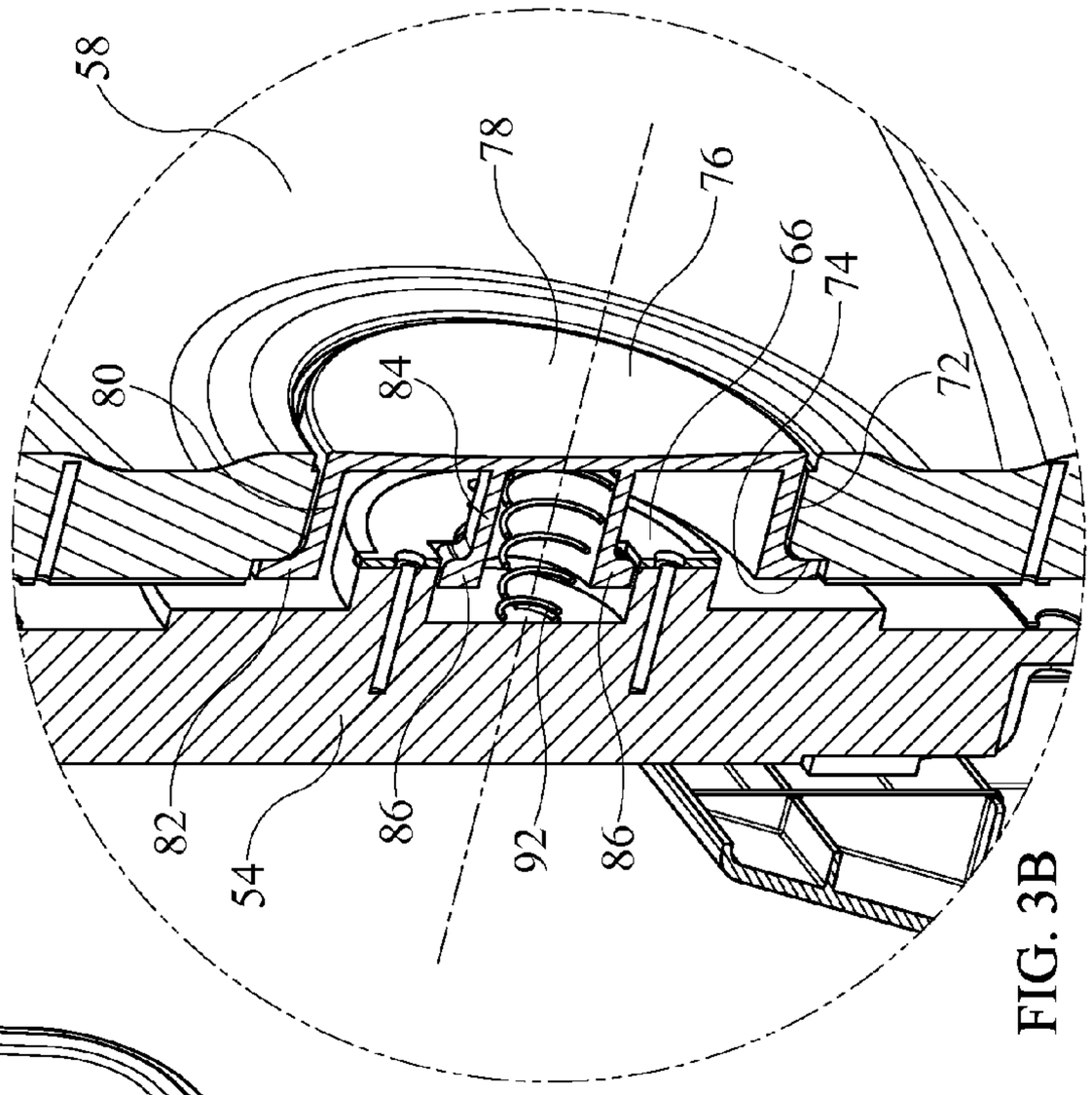

FIG. 3B

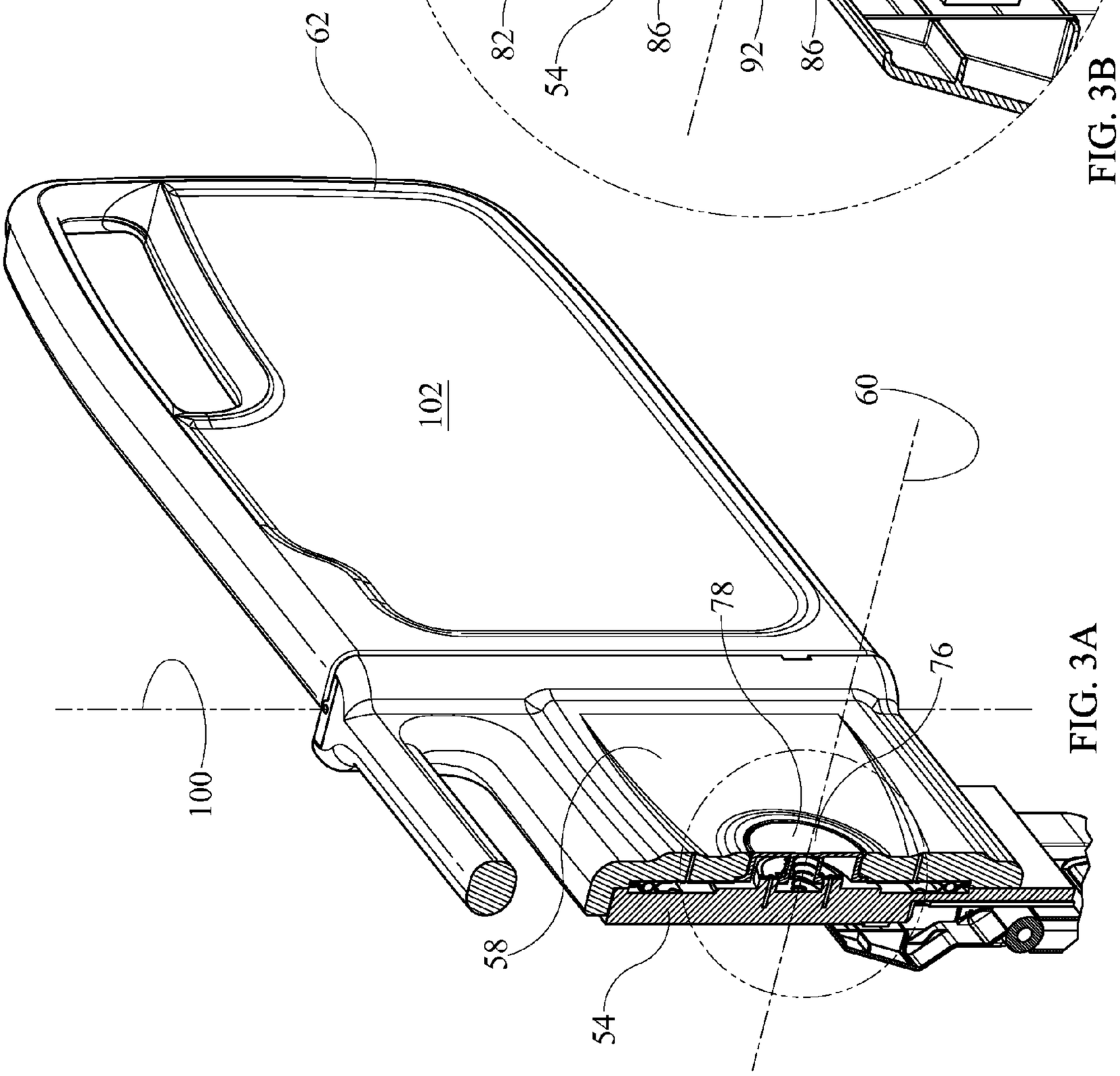

FIG. 3A

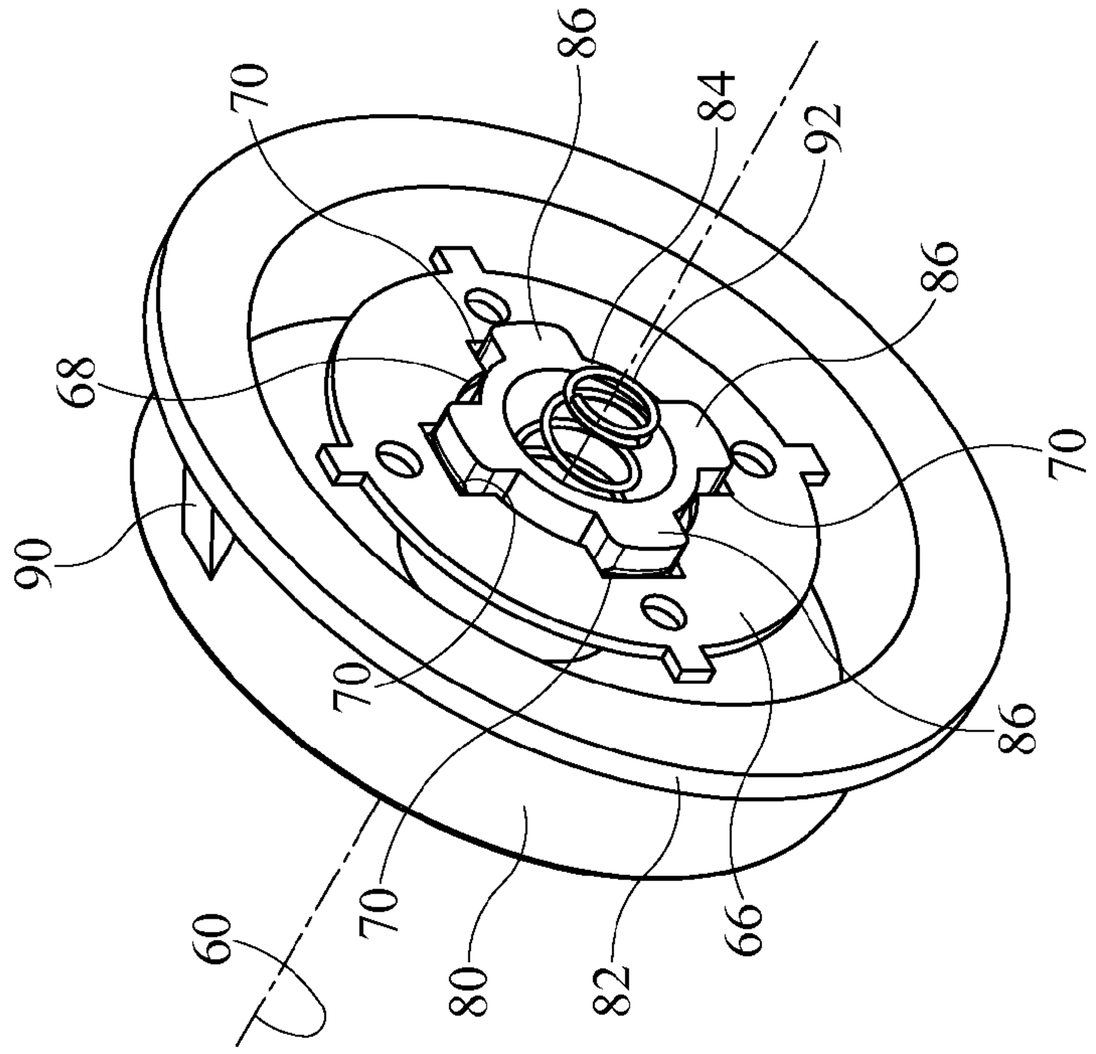
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FIG. 5

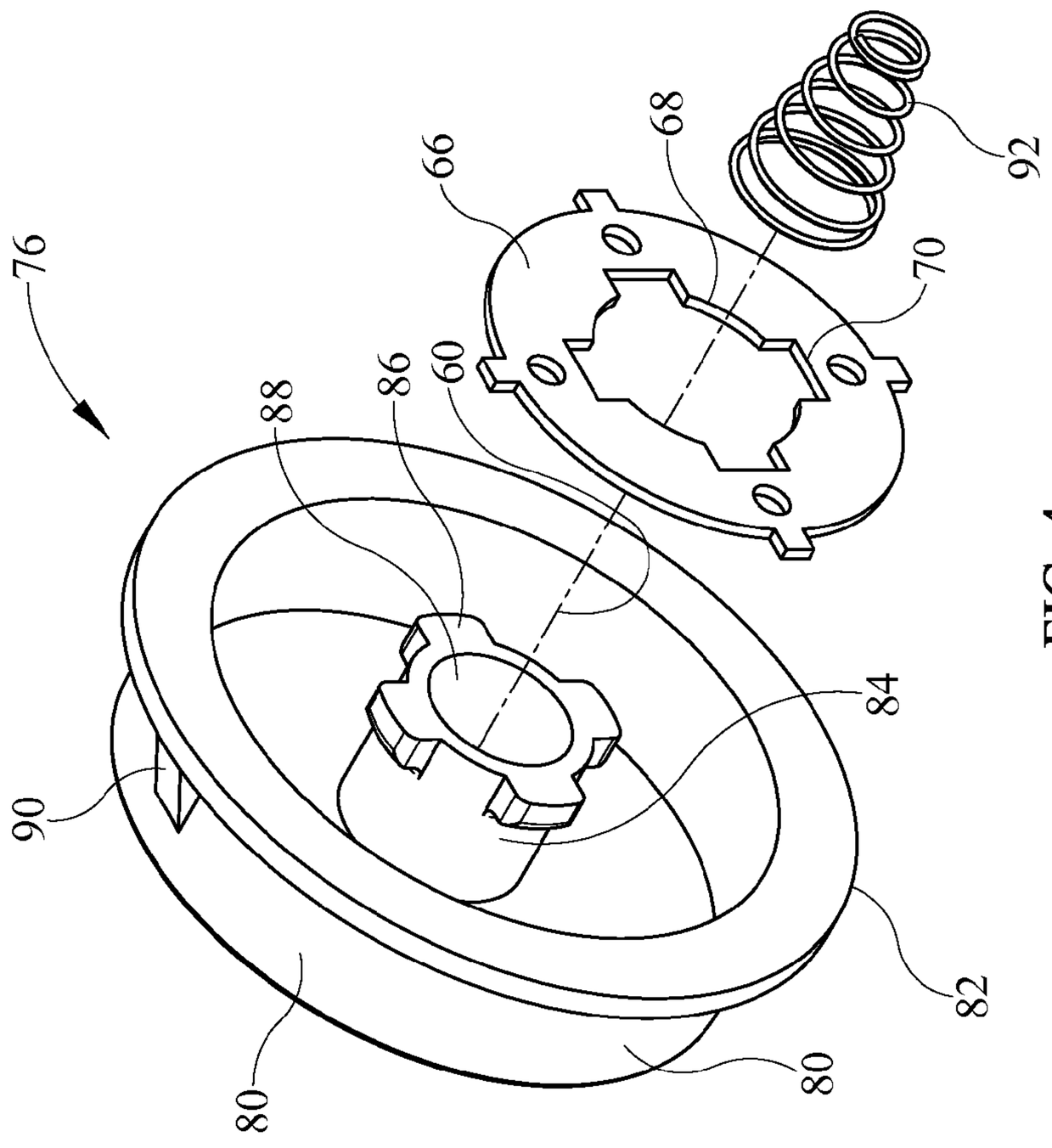
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FIG. 4

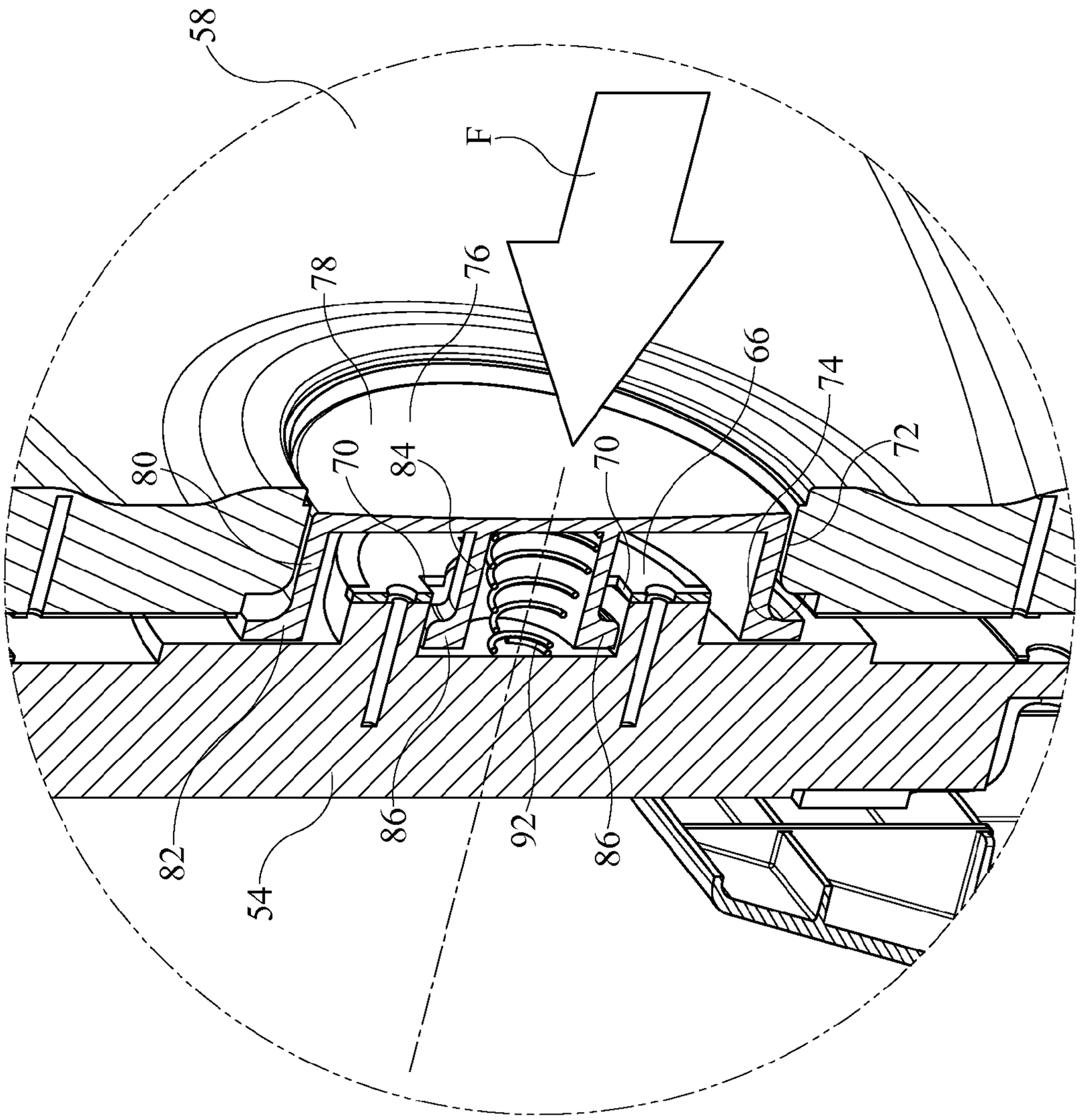
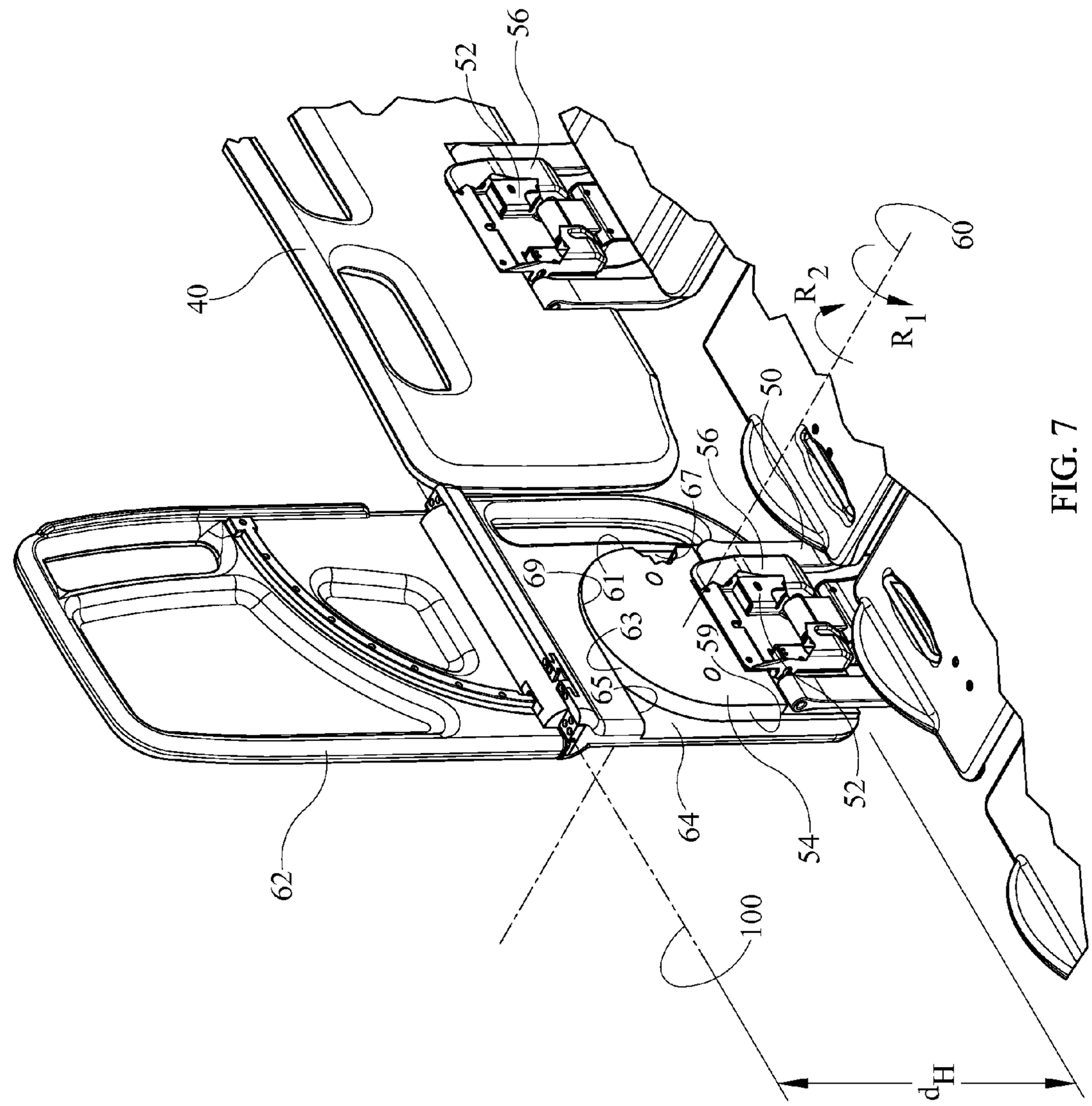


FIG. 6



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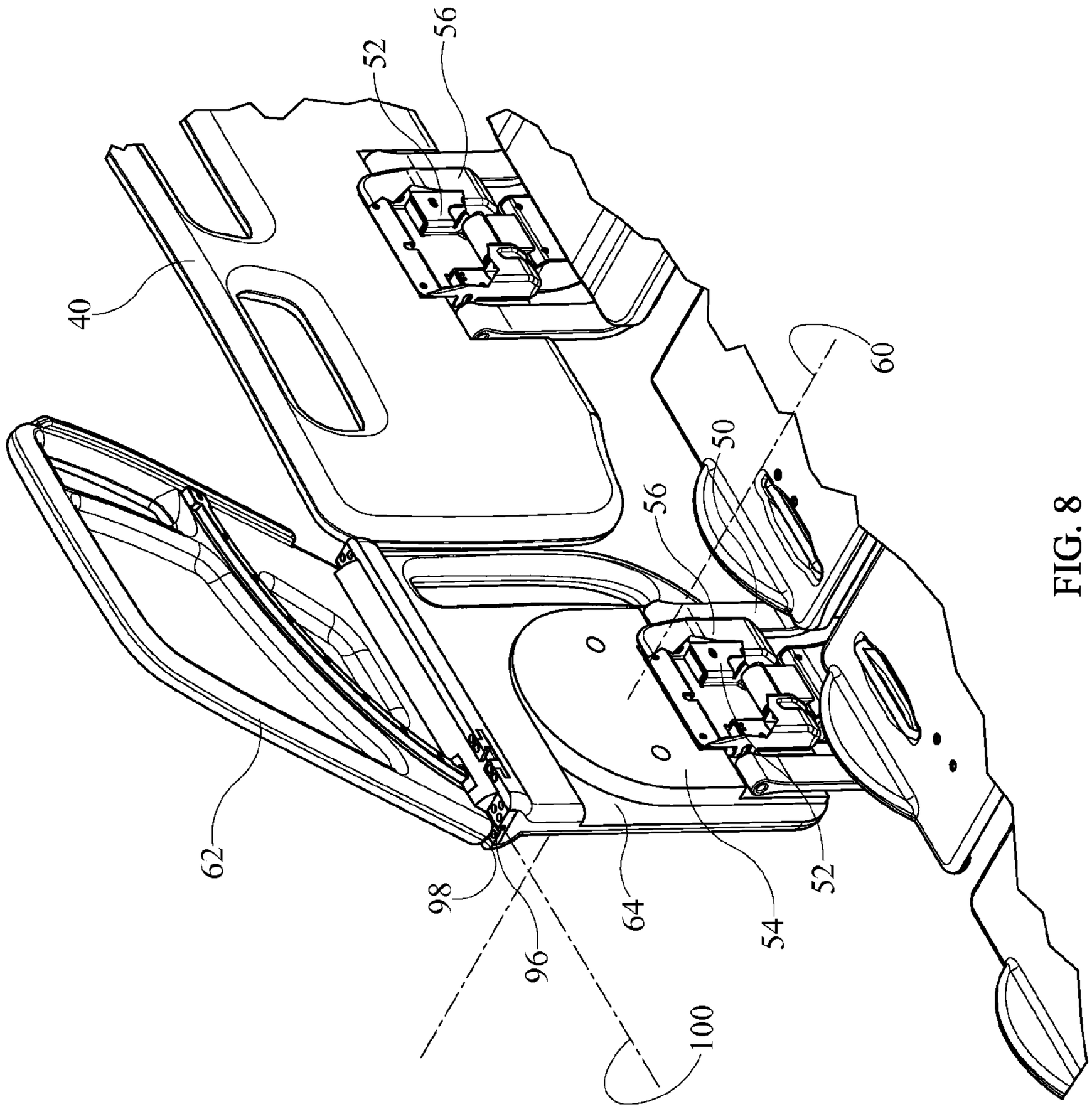

FIG. 8

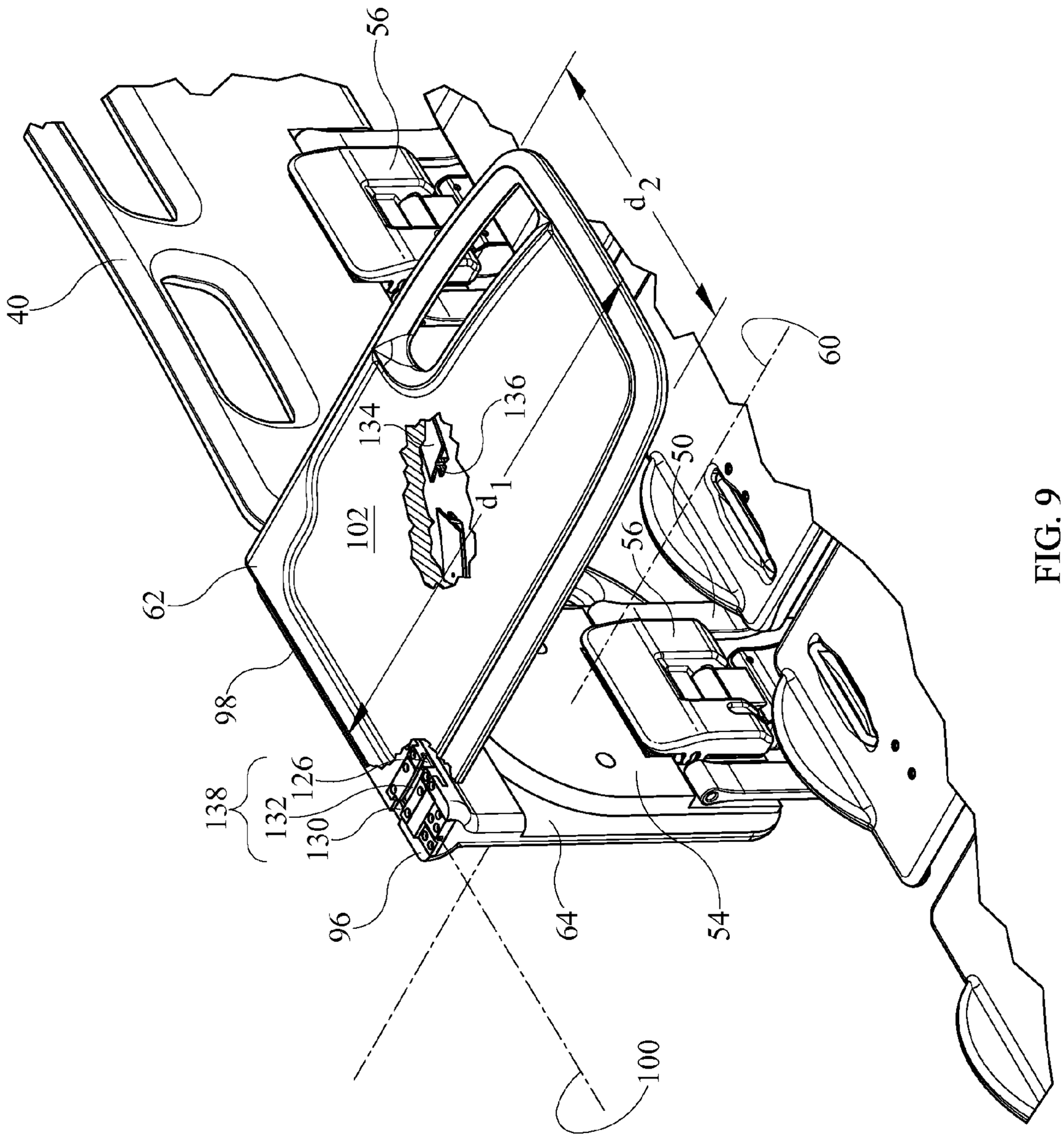

FIG. 9

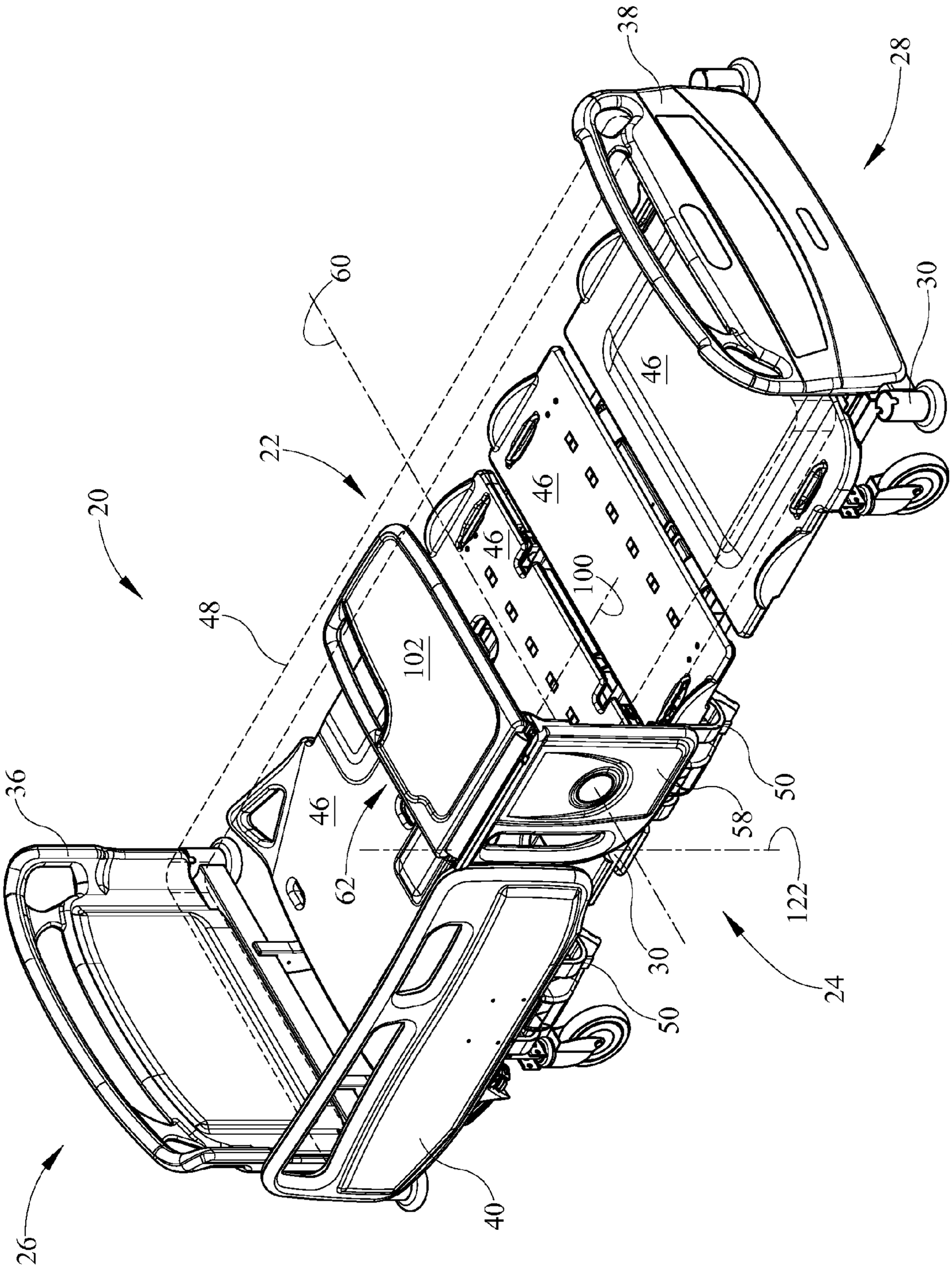

FIG. 10

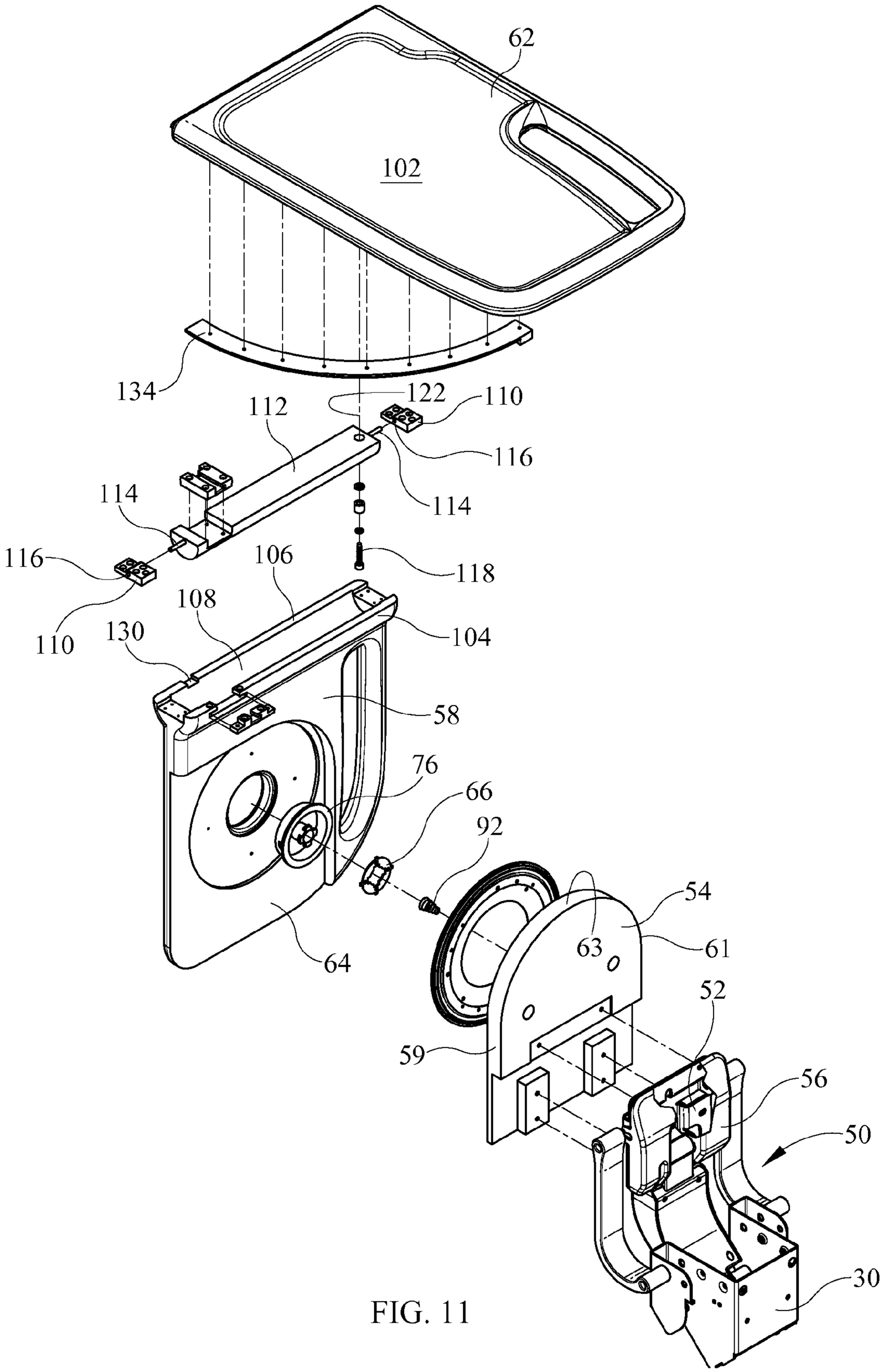
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FIG. 11

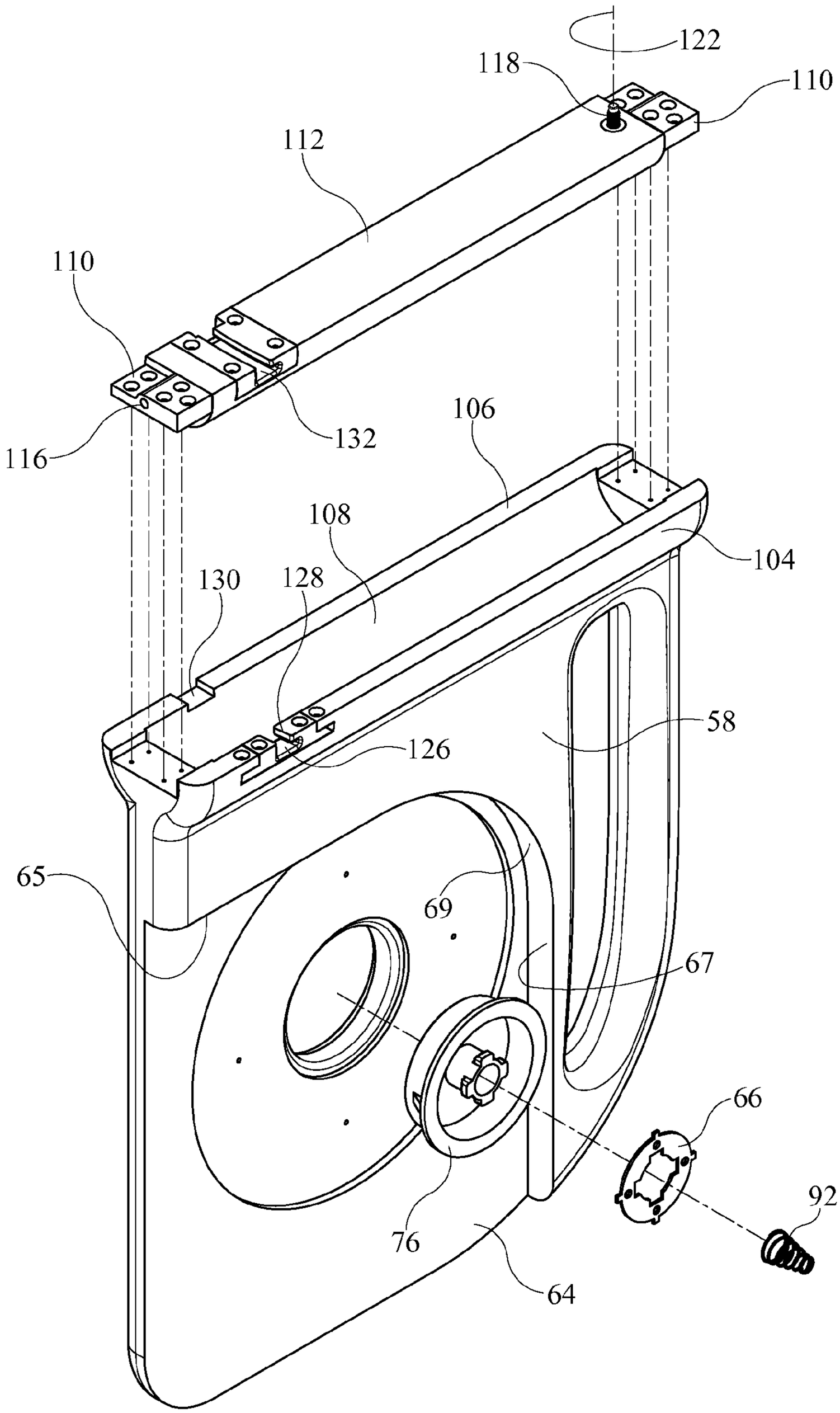
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FIG. 12

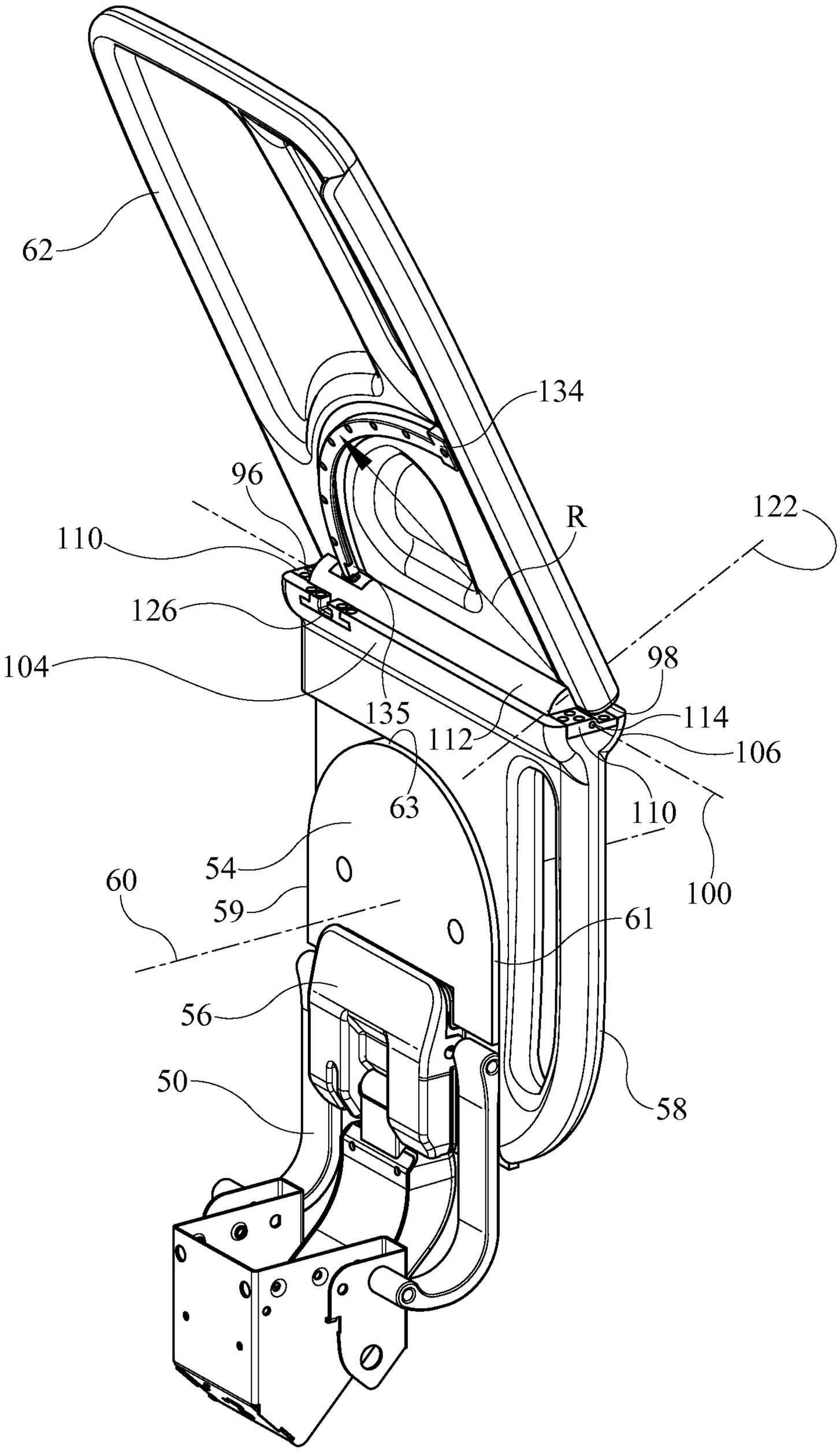
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FIG. 13

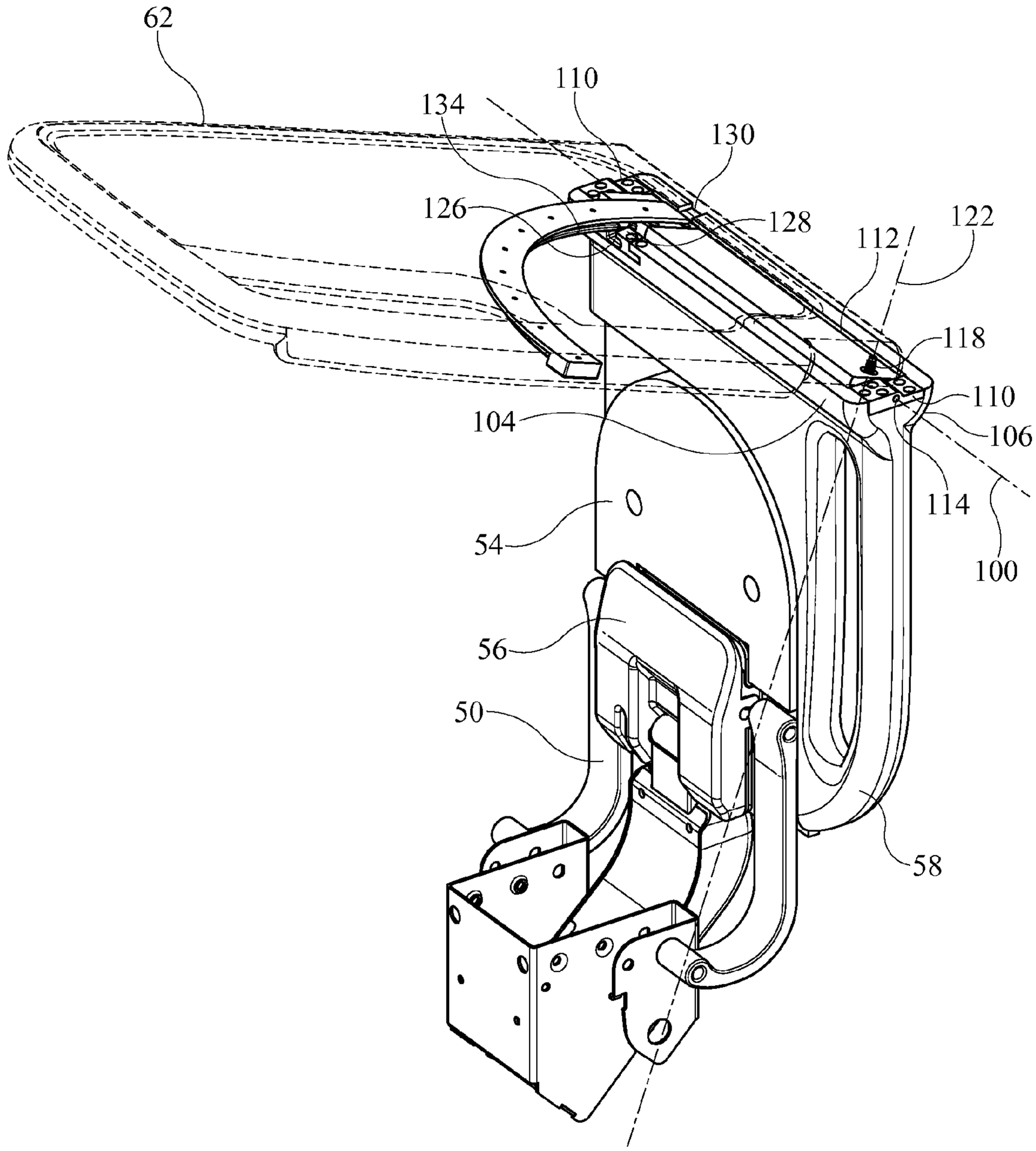

FIG. 14

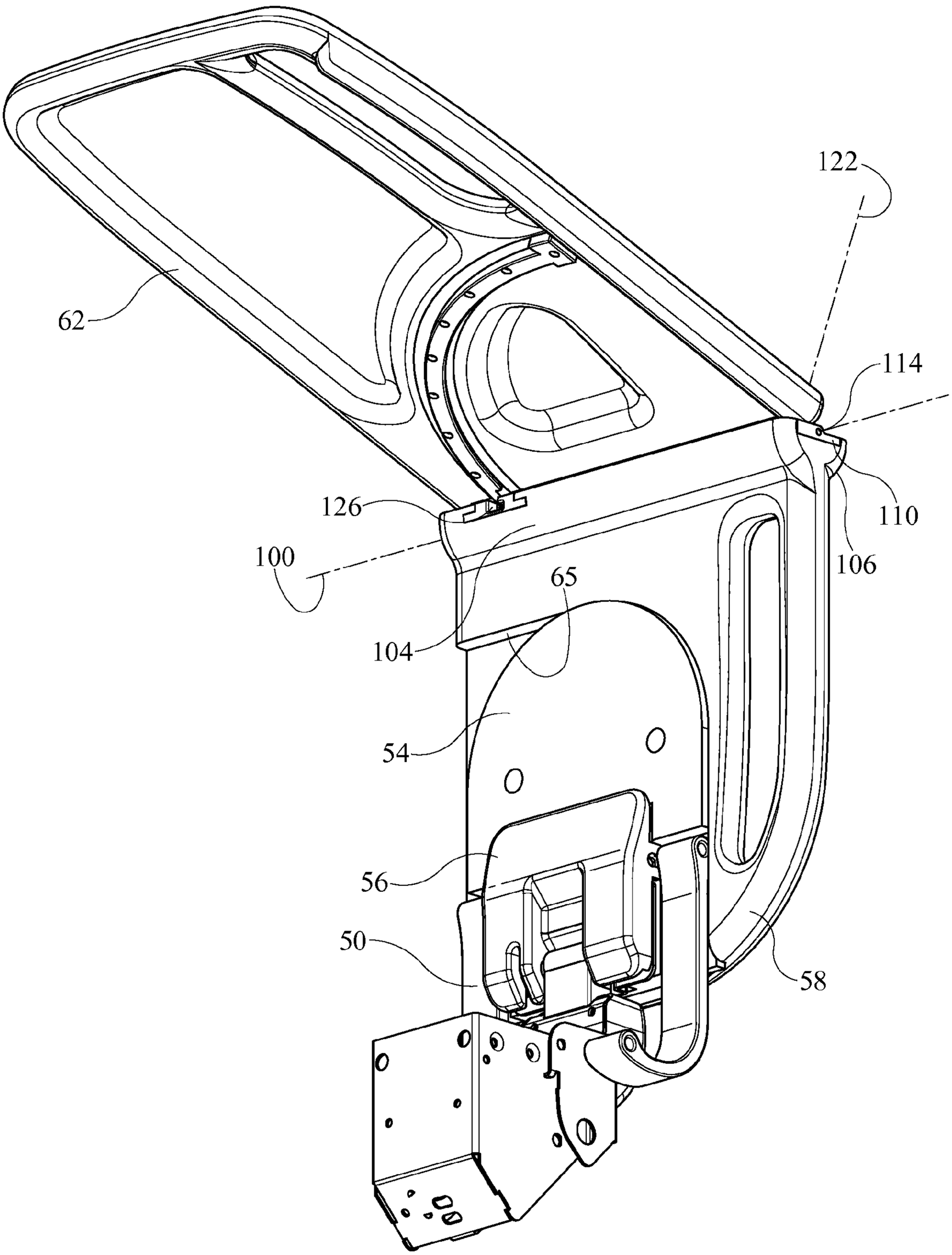

FIG. 15

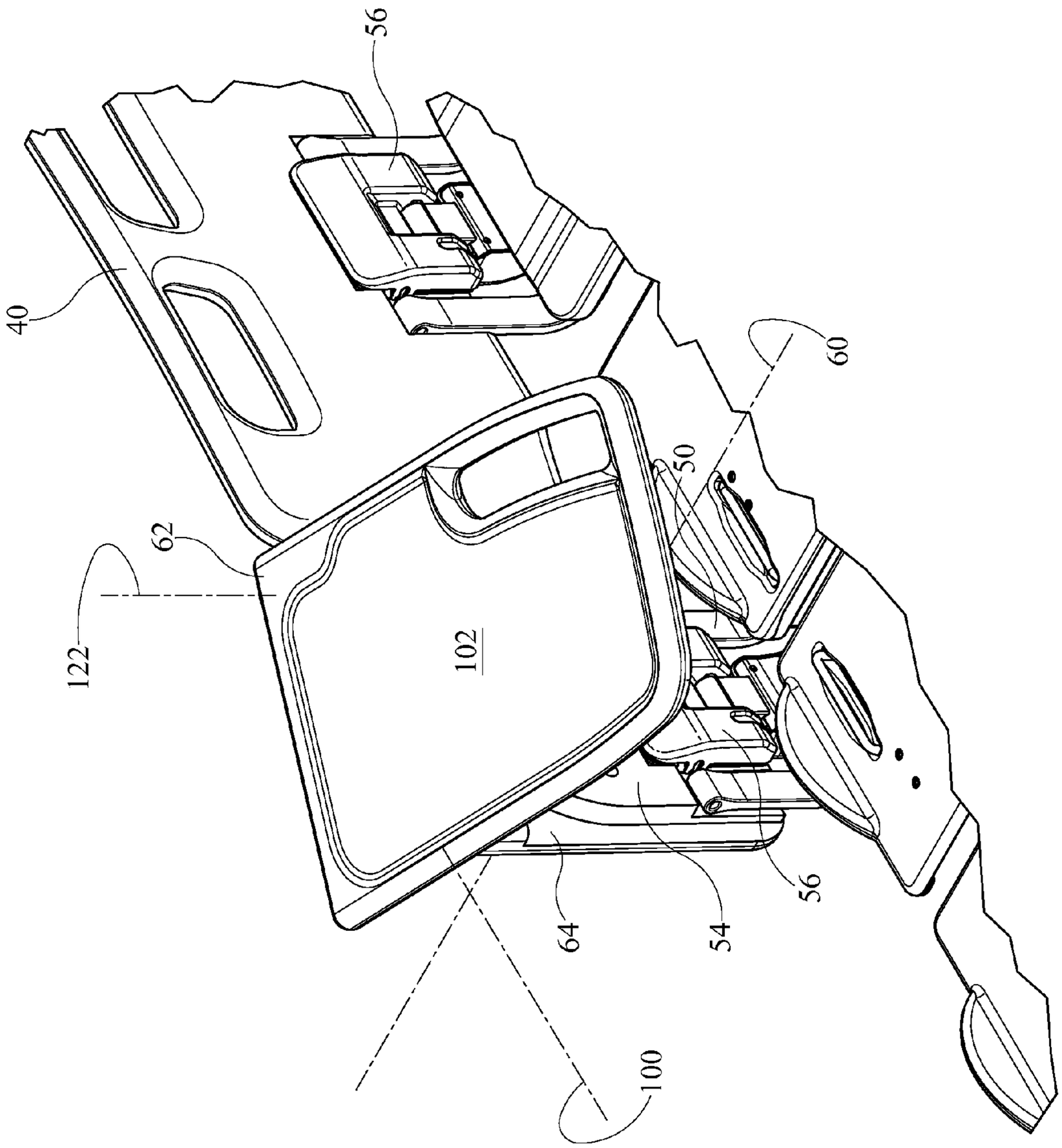

FIG. 16

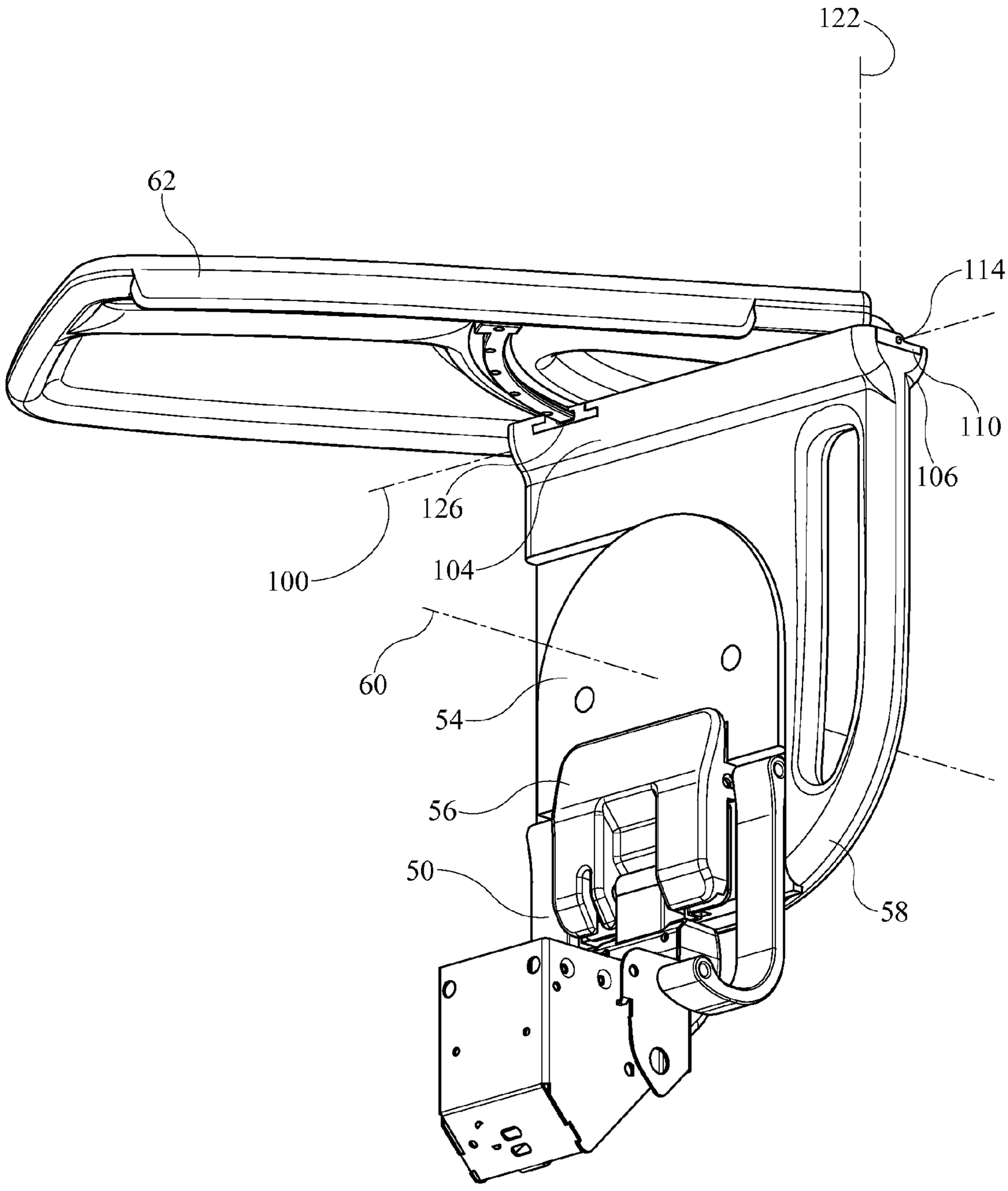

FIG. 17

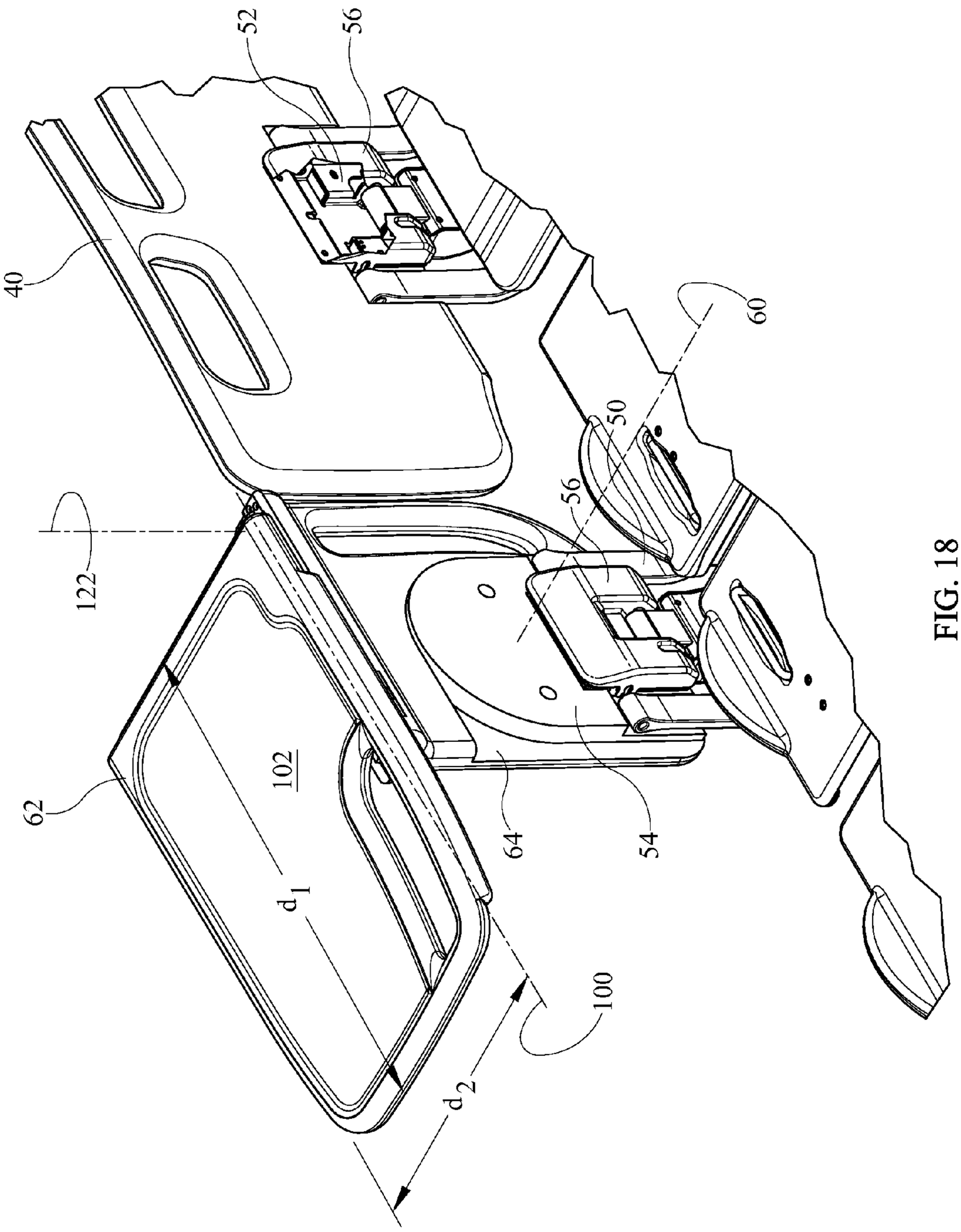

FIG. 18

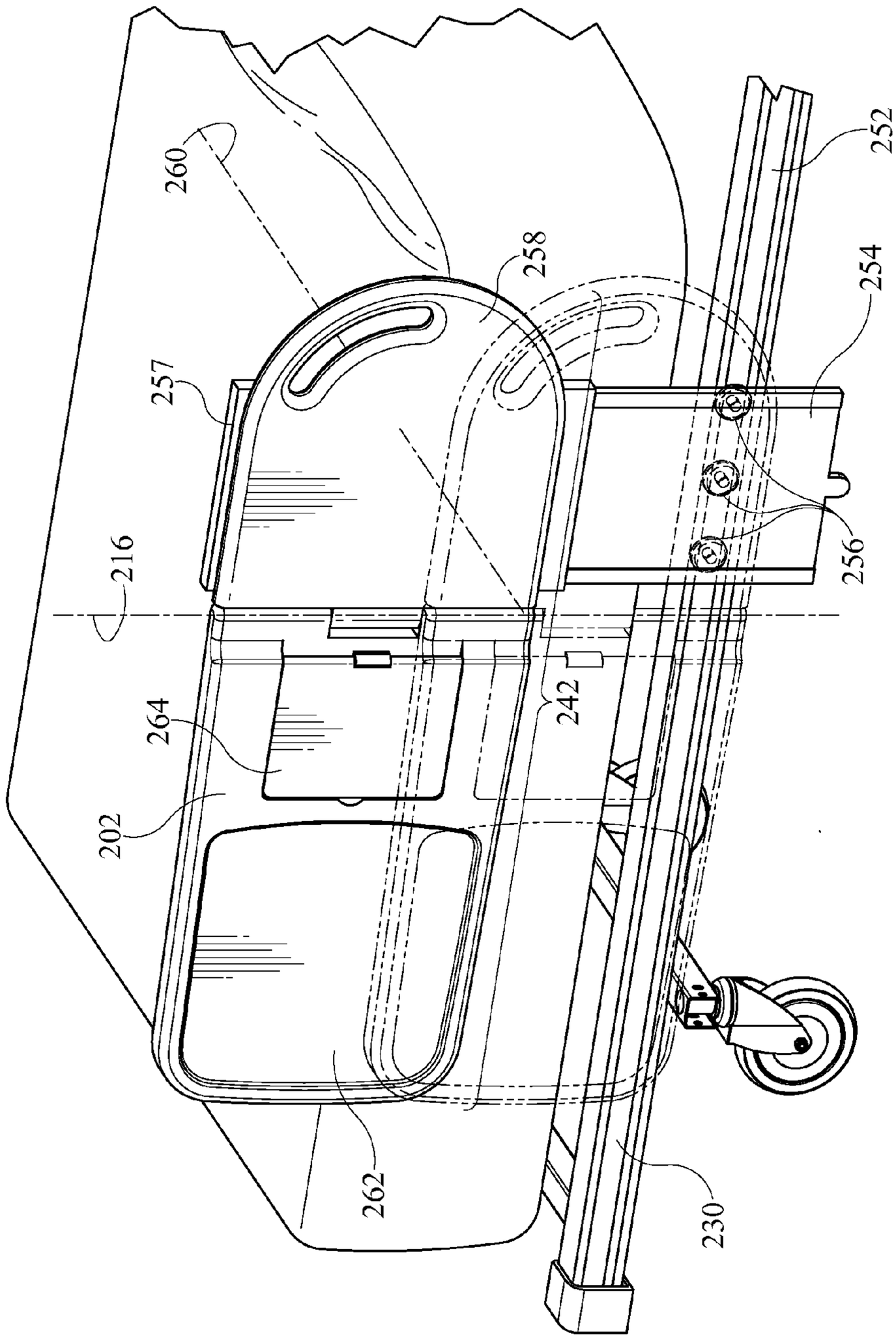

FIG. 19

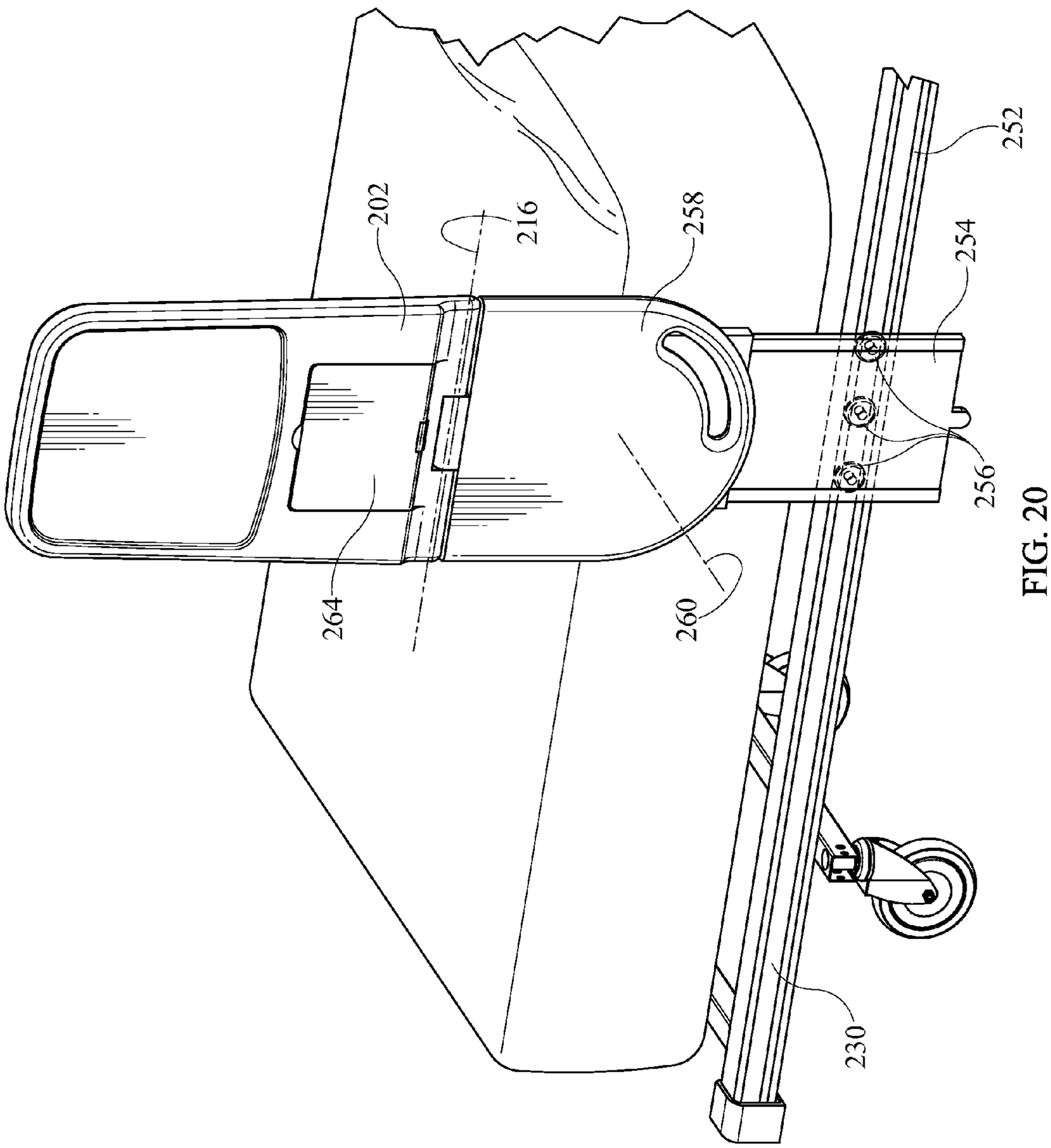

FIG. 20

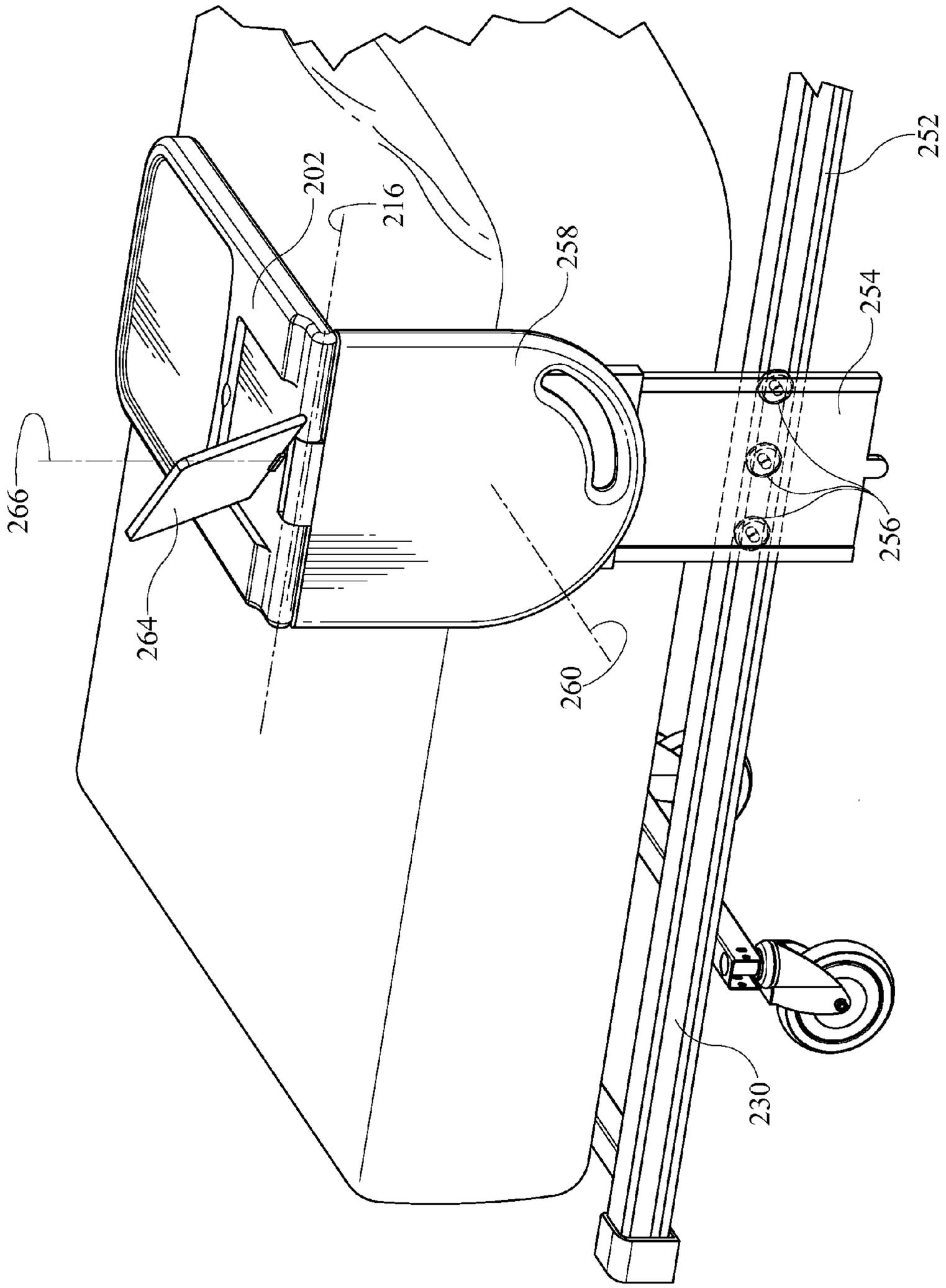

FIG. 21

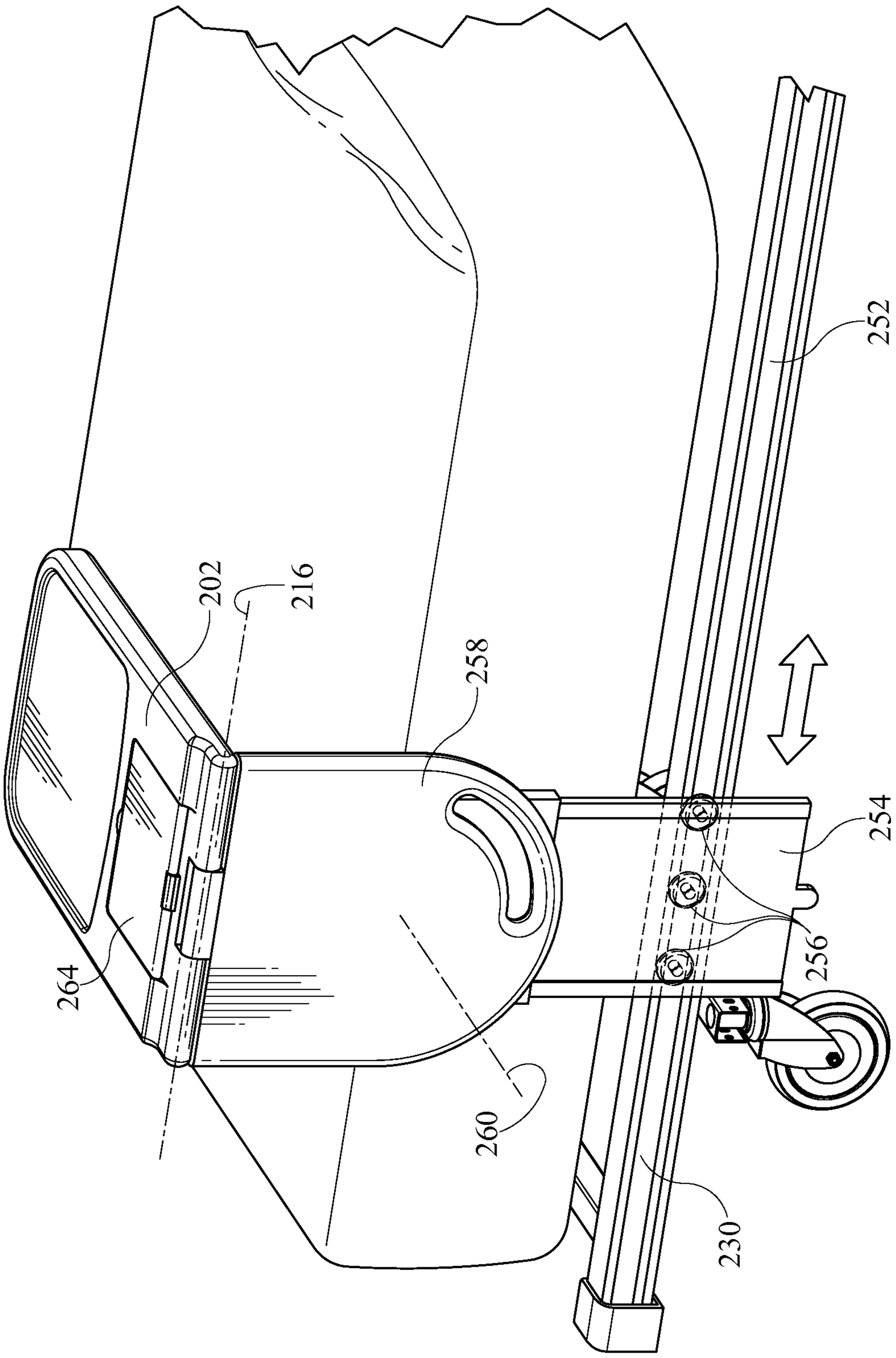

FIG. 22

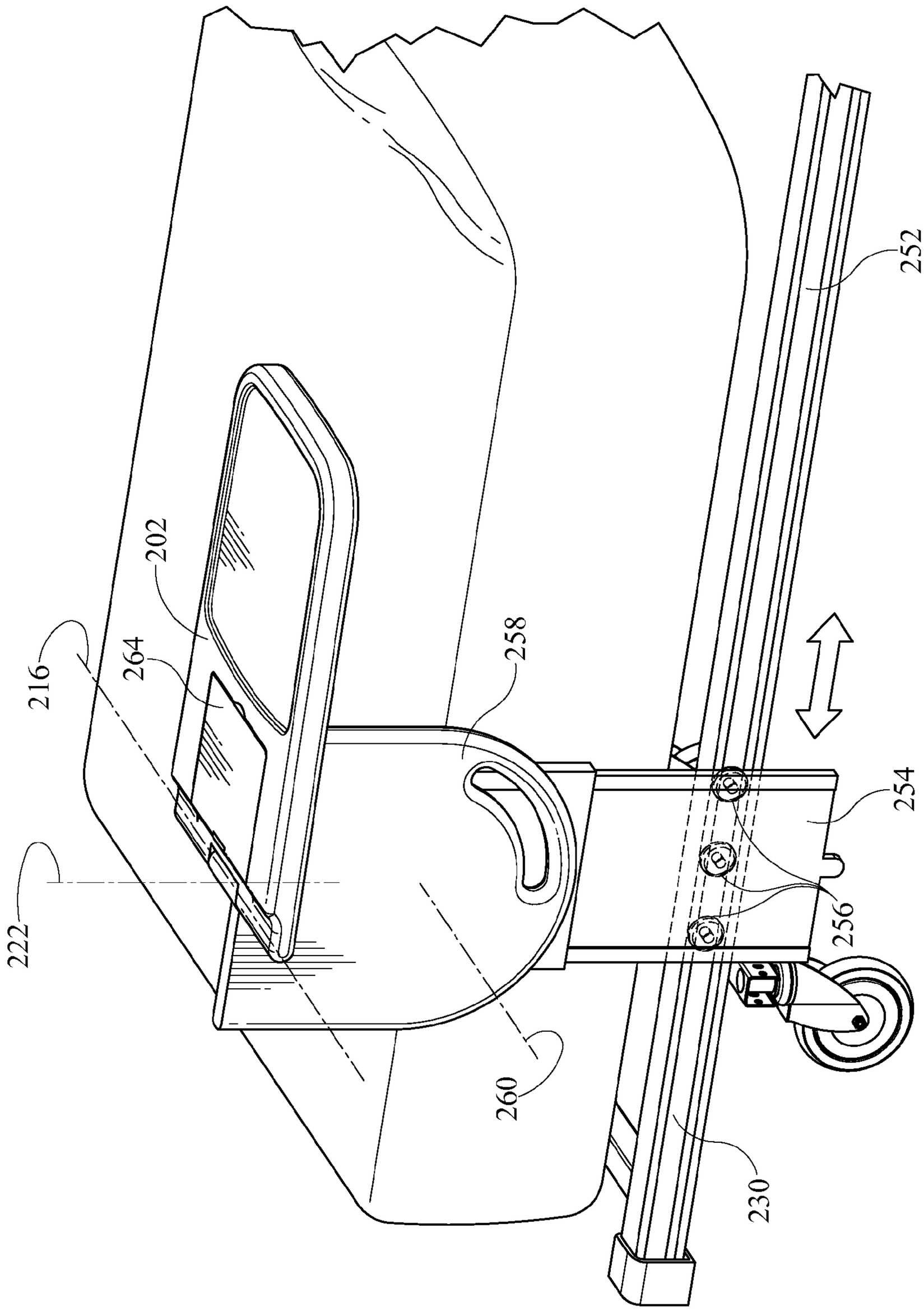

FIG. 23

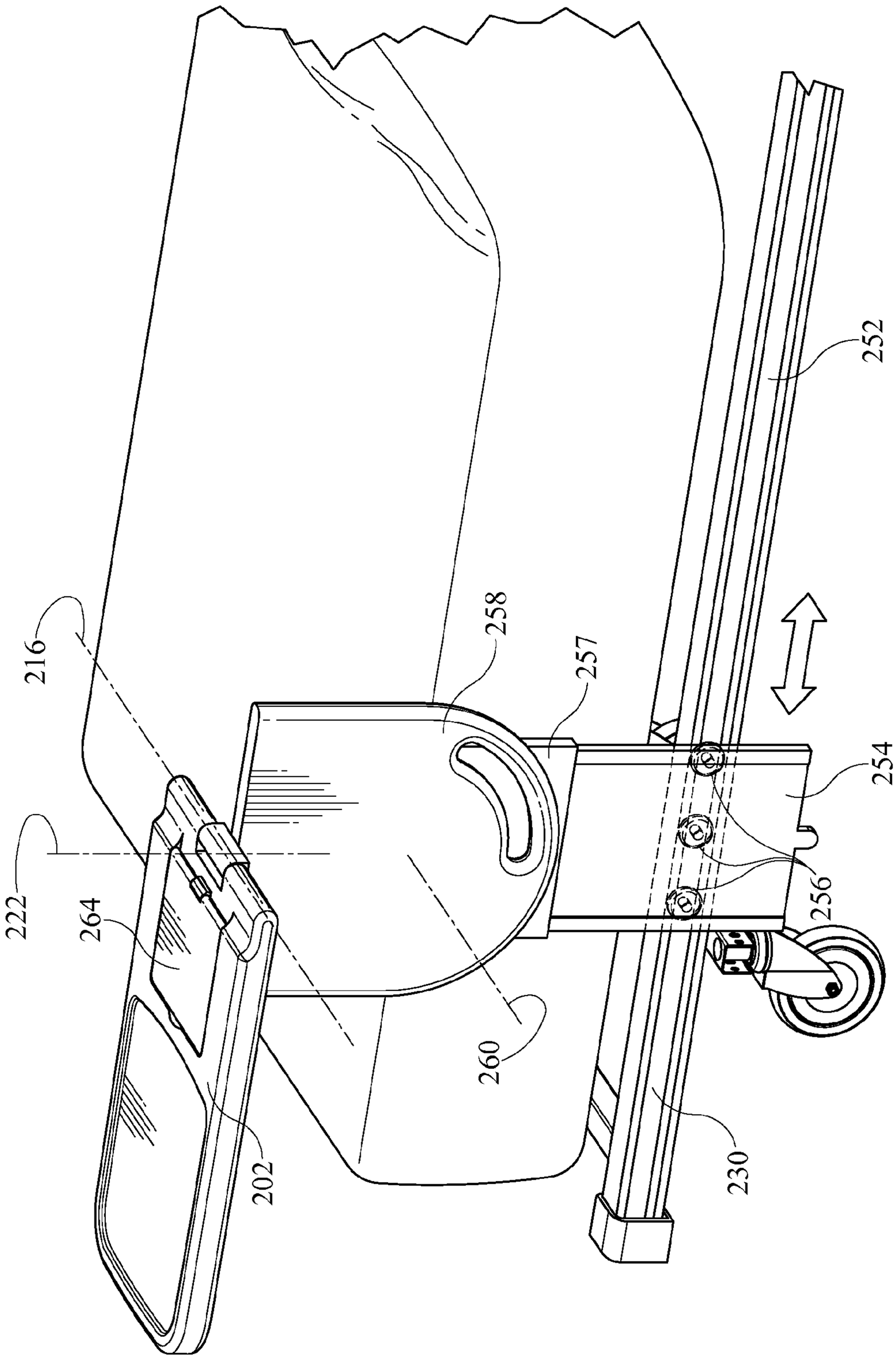

FIG. 24

COMBINED SIDERAIL AND OVER-BED TABLE

TECHNICAL FIELD

The subject matter described herein relates to a multi-functional unit capable of serving as a bed siderail and as an over-bed table. One example application for the unit is as a feature of a bed used in a health care facility or in a home care setting.

BACKGROUND

Beds used in health care facilities and in home care settings may be equipped with a dedicated table permanently affixed to the bed and positionable over the thighs of an occupant of the bed. Such tables can usually be repositioned when not in use by the occupant or when a caregiver requires access to the occupant. Other styles of table are non-permanently attachable to the bed. Still other table styles have a C-shaped profile featuring horizontally extending base and tray portions connected to each other by a vertical support. When in use as an overbed table the base portion fits laterally underneath the bed, the tray portion extends laterally across the bed at an elevation higher than the occupant's thighs, and the support extends vertically near the left or right side of the bed.

Despite the usefulness of the above described tables, they are not without certain shortcomings. Permanently attached, dedicated tables add to the weight and complexity of the bed. Non-permanently attachable tables require effort to be attached to and detached from the bed and contribute to facility clutter when not in use. The C-shaped table, while convenient to position and reposition, expands the "footprint" of the bed when in use and contributes to facility clutter when not in use.

It is, therefore, desirable to reduce the weight, complexity, effort of use, floor space consumption and clutter associated with conventional over-bed tables.

SUMMARY

A combined siderail/over-bed table unit for a bed has a table position in which at least part of the unit overlies a mattress region of the bed thereby serving as an over-bed table and also has a siderail position allowing the unit to serve as a siderail.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other features of the various embodiments of the innovation described herein will become more apparent from the following detailed description and the accompanying drawings in which:

FIG. **1** is a perspective view of a hospital bed showing frame, deck, side rail and combined side rail/over-bed table components as well as a region for a mattress.

FIG. **2** is a perspective view of the siderail/over-bed table of FIG. **1** as seen from the occupant's side of the siderail/over-bed table unit.

FIG. **3**A is a view of the siderail/over-bed unit of FIG. **2** cutaway to reveal internal components of the unit, including a button shown in a neutral state.

FIG. **3**B is an enlarged view of a portion of FIG. **3**A.

FIG. **4** is an exploded view of components visible in FIGS. **3**A and **3**B.

FIG. **5** is an assembled view of the components of FIG. **4**.

FIG. **6** is a view similar to FIG. **3**B showing the button in a depressed state.

FIG. **7** is a view similar to that of FIG. **2** showing the combined siderail/over-bed table unit having been rotated 90° about a heel axis.

FIG. **8** is a view similar to that of FIG. **7** showing an extension portion of the siderail/over-bed table unit having been rotated about a drop axis relative to a heel portion of the unit.

FIG. **9** is a view similar to FIG. **8** showing the extension having been rotated to a substantially horizontal orientation, and with certain portions of the extension broken away to reveal additional features of the siderail/over-bed table unit.

FIG. **10** is a view similar to FIG. **1** showing the siderail/over-bed table unit in the orientation of FIG. **9**.

FIG. **11** is an exploded view showing components of the siderail/over-bed table unit.

FIG. **12** is a view of the heel component of FIG. **11** with selected components having been assembled.

FIG. **13** is a view similar to FIG. **8** as seen by an observer positioned more toward the head end of the bed.

FIG. **14** is a view similar to FIG. **13** with the extension portion of the siderail/over-bed table unit shown in phantom and rotated toward a more horizontal orientation.

FIG. **15** is a view similar to FIG. **13** showing the siderail/over-bed table unit rotated toward a more horizontal position.

FIG. **16** is a view similar to FIG. **9** showing the extension portion of the siderail/over-bed table unit rotated slightly about a swing axis.

FIG. **17** is a view similar to FIG. **16** showing the extension portion as seen from underneath and further rotated about the swing axis.

FIG. **18** is a view similar to FIG. **16** showing the extension portion further rotated about the swing axis.

FIG. **19** is a perspective view of a portion of a hospital bed showing a second embodiment of a siderail/over-bed table in both a raised (solid lines) and a lowered (phantom) position.

FIG. **20** is a view similar to FIG. **19** showing the combined siderail/over-bed table unit rotated 90° about the heel axis.

FIG. **21** is a view similar to FIG. **20** showing an extension portion of the unit rotated 90° about a drop axis and also showing an occupant interface device unfolded from a surface of the extension.

FIG. **22** is a view similar to FIG. **21** with the siderail/over-bed table unit translated more toward the foot end of the bed.

FIG. **23** is a view similar to FIG. **22** showing the extension portion of the unit rotated approximately 90° about a swing axis toward the head end of the bed.

FIG. **24** is a view similar to FIG. **22** showing at the extension portion of the unit rotated approximately 90° about a swing axis toward the foot end of the bed.

DETAILED DESCRIPTION

FIG. **1** shows a hospital bed **20** having a left side **22** a right side **24** laterally spaced from the right side, a head end **26** and a foot end **28** longitudinally spaced from the head end. The bed includes a frame **30**, a headboard **36** and a footboard **38** attached to the frame, and left and right head end siderails **40**, only the right one of which is shown. The bed also includes at least one siderail/over-bed table (OBT) unit **42**, shown on the right side of the bed near the foot end. The left side foot end of the bed may have a similar unit or may have a conventional foot end siderail. The frame also includes one

or more deck sections **46**, at least one of which is orientation adjustable. The frame defines, at least in part, a spatial region **48**, shown in phantom, for a mattress. The mattress region has dimensions corresponding to a mattress, not shown, intended to be placed on the frame.

Referring additionally to FIG. **2** the frame also includes four mechanisms **50** each having a mounting plate **52** concealed under a plastic cover **56** Each mounting plate is associated with either one of the conventional siderails or with the combined siderail/OBT unit **42**. The illustrated mechanisms are four bar linkage "drop down" mechanisms. Each mechanism associated with a siderail is connected to the siderail to support the siderail and allow it to be moved vertically between a raised or deployed position, as shown, and a lowered or retracted position. The mechanism includes a latch (not depicted) to secure the siderail or combined siderail/OBT in the raised position. A release handle **44** is provided to allow a user to release the latch. The mounting plate **52** of the mechanism associated with the siderail/OBT unit is connected to a base plate **54**, which is stationary relative to the mounting plate. The base plate connects the combined siderail/OBT unit **42** to the mechanism **50**, to support the unit and allow it to be moved vertically between raised and lowered positions. The mechanism includes a latch (not depicted) to secure the combined siderail/OBT in the raised position. A release handle **44** is provided to allow a user to release the latch. The connection between the siderail/OBT unit and the frame is a permanent connection in that the siderail/OBT, despite being attached to the frame, is not normally intended to be easily detached from the frame.

As seen best in FIGS. **1** and **2** the siderail/OBT has a siderail position in which the unit borders the mattress region **48** thereby serving as a siderail. As a practical matter, the unit, when in its siderail position, is immediately proximate to the lateral extremity of the mattress region **48** so that the unit is sufficiently close to the mattress to serve as a siderail. That is, the unit is laterally outboard of the mattress, but close enough to the mattress to not leave an objectionably large lateral gap between the unit and the mattress. The thickness t of the unit is small in comparison to its other two dimensions, D_1 and D_2, therefore the unit extends predominantly in the longitudinal and vertical directions when in the siderail position.

The combined siderail/OBT includes a heel **58** pivotably connected to base plate **54** so that the heel is rotatable about laterally extending heel axis **60**. The base plate has two substantially parallel surfaces **59**, **61** and a curved surface **63** extending between the parallel surfaces. Surface **61** is more readily visible in FIG. **13**. The base plate resides in a recess **64** of the heel. The recess has two substantially perpendicular surfaces **65**, **67** and a curved surface **69** extending between the perpendicular surfaces. Surfaces **67** and **69** are more readily visible in FIG. **12**; surface **65** is more readily visible in FIG. **15**. The siderail/OBT also includes an extension **62** extending from the heel. In the siderail position the heel and extension are substantially coplanar with each other. The extension has a first dimension d_1 and a second dimension d_2 orthogonal to the first dimension. When the siderail/OBT unit is in the siderail position (FIGS. **1**, **2**) first dimension d_1 extends longitudinally and second dimension d_2 extends vertically.

FIGS. **3-6** show further details of the pivotable connection between heel **58** and base plate **54**. A latch plate **66** having a central cruciform opening **68** with a set of four equiangularly distributed notches **70** is secured to the base plate **54**. The heel includes an opening **72** with a shoulder **74**. A laterally translatable button **76** occupies the opening. The button has a face **78**, a rim **80**, a flange **82**, a hub **84** extending from the back of the face and four equiangularly distributed lugs **86** projecting radially from the distal end of the hub. An integral key **90** having an inclined profile extends from the rim to the flange. The key fits into a notch (not illustrated) on the heel to resist rotation of the button relative to the heel about heel axis **60**. A compressed spring **92** extends from the back side of the button face, through bore **88** of the hub, and into contact with the base plate. The shoulder **74** cooperates with flange **82** to retain the button in the opening despite the force exerted by the compressed spring. FIGS. **3**A and **3**B depict the button in a neutral state in which each lug **86** engages a notch **70** in the latch plate **66**. As a result of this engagement, rotational movement of heel **58** relative to frame **30**, which includes latch plate **66** and base plate **54**, is prohibited. When a user wishes to rotate the heel (and the extension) about the heel axis, he depresses the button in a direction parallel to the heel axis **60** as indicated by the arrow F in FIG. **6** so that lugs **86** recede past notches **70** in the latch plate. Rotation of heel **58** about base plate **54** is thus enabled. Once the lugs are in an orientation that places them at least partially behind the inter-notch portions of the latch plate the user has the option to release pressure on the button. When the heel and button next arrive at an orientation at which a lug is circumferentially aligned with a notch, the spring urges the button back to its neutral state so that each lug engages a notch thereby resisting further rotation. FIG. **7** shows the unit after having been pivoted 90 degrees from the orientation of FIG. **1**. If desired, heel dimension d_H can be made long enough to impede access to release handle **44** (FIG. **1**) when the heel is pivoted to the orientation of FIG. **7**.

As seen best in FIG. **2**, recess surface **65** engages base plate surface **59** to prevent over-rotation of the heel in direction R_1 even if release button **76** is pressed. As seen best in FIG. **7** recess surface **67** engages base plate surface **61** to prevent over-rotation of the heel in direction R_2 even if release button **76** is pressed.

Referring to FIGS. **8-10** the extension and the heel have mutually proximate ends **96**, **98** that face each other when the extension and heel are in the substantially coplanar orientation of FIGS. **1** and **7**. The extension is pivotable relative to the heel about a drop axis **100** parallel to the mutually proximate ends. A user would not normally pivot the extension about the drop axis without having first effected the 90 degree orientation change of FIG. **7** (relative to FIG. **1**). However once the unit has been positioned as seen in FIG. **7**, the extension can be pivoted inboard (i.e. toward the occupant side of the siderail/OBT) about the drop axis (FIG. **8**) and placed in a table position, seen in FIGS. **9** and **10**, in which the extension, or at least a substantial portion thereof, overlies mattress region **48** with the extension, or at least a table surface **102** thereof, in a horizontal orientation thereby serving as an over-bed table for the occupant. When the unit is in the table position, the extension extends predominantly in the longitudinal and lateral directions so that the first dimension d_1 extends laterally and the second dimension d_2 extends longitudinally.

FIGS. **11-15** shows further details of the heel and extension. End **96** of the heel is flared to define an inboard wall **104** and an outboard wall **106** with a semi-cylindrical trough **108** between the walls. Bridges **110** span between the walls. A semi-cylindrical roller **112** resides in the trough and is retained therein by a pair of hinge pins **114** each of which projects from the roller and extends into an opening **116** in the adjacent bridge **110**. The pins define the drop axis **100**.

A stud **118** projects from the roller near one of the bridges. The stud defines a swing axis **122**, which is perpendicular to drop axis **100**. Near the other bridge an L-shaped groove **126** extends through inboard wall **104** and is partially bordered by an overhang **128**. A rectangular groove **130** extends through the outboard wall. An L-shaped groove **132** extends through the roller. When the extension and heel are in the relative orientation of FIG. **10**, the L-shaped and rectangular grooves **126**, **130**, **132** cooperate with each other to define a guide slot **138** in the heel. A curved rail **134**, also partially visible in FIG. **13**, projects from the underside of the extension. The rail has a nominal radius of curvature R (FIG. **13**) centered on the swing axis **122**. One end **135** of the rail has a rectangular profile. Most of the rail has an L-shaped profile with a foot portion **136** (FIG. **9**).

When the heel and the extension are in the coplanar relative orientation of FIG. **7**, the extension is rotatable about the drop axis **100**, but not about swing axis **122** because end **96** of the heel contacts end **98** of the extension to block rotation of the extension about the swing axis. As the extension is lowered toward a 90 degree relative orientation (FIG. **8**), any significant rotation about the swing axis is similarly impeded. When the extension is at the 90 degree orientation (FIGS. **9** and **10**) its underside is substantially parallel to end **96** of the heel and rests on the inboard wall **104** of the heel. In addition the rail **134** registers with the guide slot **138**. Accordingly, as seen in FIG. **16-18**, a user can pivot the extension about swing axis **122** to swing the extension laterally outwardly to a secondary position (FIG. **18**) at which the first dimension d_1 extends predominantly longitudinally and the second dimension d_2 extends predominantly laterally. Swinging the extension about the swing axis causes rail **134** to engage guide slot **138**. After the rail enters the guide slot, rail foot **136** cooperates with wall overhang **128** to prevent upward rotation of the extension about drop axis **100**. The guide slot **138** may have a nominal radius of curvature substantially equal to the radius of curvature R of the rail **134** or may be a linearly extending slot dimensioned to accommodate rotation of the rail about the swing axis.

FIGS. **19-24** show an alternative embodiment **242** of the combination siderail/OBT unit. Referring first to FIG. **19**, the bed frame **230** includes a longitudinally extending track **252**. A support plate **254** is translatably joined to the track, for example by rollers **256**. A sleeve **257** is connected to the support plate and is vertically translatable relative to the support plate. The siderail/OBT unit has a heel portion **258** pivotably connected to the sleeve so that the heel is pivotable about heel axis **260**. An extension **262** extends from the heel and is pivotably connected thereto so that the extension is pivotable relative to the heel about drop axis **216**. The slidable connection between sleeve **257** and support plate **254** allows the unit to be adjusted between a raised position (solid lines) and a lowered position (phantom) below the top surface of the mattress.

FIG. **20** shows the unit after a user has pivoted the heel, and therefore the extension as well, ninety degrees about heel axis **260**. FIG. **21** shows the unit in the table position achieved by subsequently pivoting the extension 90 degrees about the drop axis **216**.

The siderail/OBT unit also includes an occupant interface device **264** that folds down flush with table surface **202** as seen in FIGS. **19-20** and unfolds away from surface **202** as seen in FIG. **21**. Device **264** is pivotable about a device axis **266**. Examples of the specific types of devices include a keypad allowing the occupant to command certain functions of the bed, and an information display.

FIG. **22** shows the unit having been longitudinally translated relative to its position in FIG. **21**. The translatability is a consequence of the translatable connection between support plate **254** and track **252**.

As seen in FIGS. **23** and **24** the extension is also pivotable relative to the heel about a swing axis **222**.

Although the various embodiments of the unit are useful as an over-bed table, they retain, when in the siderail position, all the typical functionality of a siderail. For example they can be raised to a deployed position to define the lateral edges of the mattress and can be retracted to a stowed position to allow for occupant ingress and egress and to allow an attendant to access the occupant. The extension plays two mutually exclusive roles. It serves as part of the siderail when the unit is in the siderail position, but serves as a table when the unit is in the table or secondary position. Even when the unit is in the table position, part of the unit (heel **58** of the first embodiment and support plate **254** and sleeve **257** of the second embodiment) are at least partially effective as a siderail insofar as those parts define the lateral edge of the mattress.

Although this disclosure refers to specific embodiments, it will be understood by those skilled in the art that various changes in form and detail may be made without departing from the subject matter set forth in the accompanying claims.

We claim:

1. A patient support apparatus comprising:

a frame;

a deck supported by the frame; and

a siderail comprising a table portion movable between a table position in which the table portion extends generally horizontally over at least a portion of the deck and is spaced from the deck, and a siderail position in which the table portion extends generally vertically along at least a portion of a side of the deck.

2. The patient support apparatus of claim **1**, comprising a main siderail portion and a hinge rotatably connecting the table portion to the main siderail portion.

3. The patient support apparatus of claim **2** wherein the table portion and the main siderail portion both extend generally vertically along at least the portion of the side of the deck when the table portion is in the siderail position.

4. The patient support apparatus of claim **1**, wherein the siderail is movable from a deployed position in which a majority of the siderail is higher than the deck and a stored position in which a majority of the siderail is lower than the deck.

5. The patient support apparatus of claim **4** further comprising a latch for latching the siderail in the deployed position.

6. The patient support apparatus of claim **1** in which the table portion of the siderail is an extension portion.

7. The patient support apparatus of claim **2** in which the main siderail portion of the siderail is a heel and the table portion of the siderail is an extension.

8. The patient support apparatus of claim **7** wherein the frame includes a mechanism connected to the siderail enabling the siderail to be raised and lowered relative to the deck, and wherein the heel is connected to the mechanism and is pivotable about a heel axis relative to the mechanism, and wherein the extension extends from the heel and is pivotable relative thereto about a drop axis.

9. The patient support apparatus of claim **8** wherein with the table portion of the siderail in the siderail position:

a) the heel and extension are substantially coplanar with each other such that the siderail extends predominantly in the longitudinal and vertical directions and borders a lateral side of the deck;

b) the heel axis extends substantially laterally;

c) the drop axis extends substantially vertically;

and wherein with the table portion of the siderail in the table position:

a) the heel borders the lateral side of the deck;

b) the heel extends predominantly in the longitudinal and vertical directions;

c) the extension extends predominantly in the longitudinal and lateral directions;

d) the heel axis extends substantially laterally; and

e) the drop axis extends substantially longitudinally.

10. The patient support apparatus of claim **7** wherein with the table portion in the table position the extension defines a substantially horizontal table having a first dimension and a second dimension substantially orthogonal to the first dimension.

11. The patient support apparatus of claim **10** wherein the hinge defines a drop axis and the extension is pivotable relative to the heel about a swing axis which is substantially perpendicular to the drop axis.

12. The patient support apparatus of claim **11** wherein the extension is pivotable relative to the heel between a first table position in which the first dimension extends in the longitudinal direction and the second dimension extends in the lateral direction, and a second table position in which the table is still horizontal and the first dimension extends laterally and the second dimension extends longitudinally.

13. The patient support apparatus of claim **12** wherein the second table position is a position substantially laterally outboard of the deck.

14. The patient support apparatus of claim **7** wherein the heel and extension have mutually proximate edges and the extension is pivotable relative to the heel about a drop axis substantially parallel to the mutually proximate edges.

15. The patient support apparatus of claim **14** wherein the extension is pivotable relative to the heel about a swing axis perpendicular to the drop axis.

16. The patient support apparatus of claim **8** wherein only when the table portion is in the table position the extension is also pivotable relative to the heel about a swing axis perpendicular to the drop axis.

17. The patient support apparatus of claim **7** comprising:

a curved rail projecting from an underside of the extension; and

a guide slot in the heel, the guide slot and the rail being engageable with each other only when the extension and the heel are oriented substantially perpendicular to each other.

18. The patient support apparatus of claim **17** wherein engagement of the rail and the guide slot prevents upward rotation of the extension about the hinge.

19. The patient support apparatus of claim **18** in which the hinge defines a drop axis, the rail includes a foot, and the slot includes an overhang, and in which the rail foot cooperates with the overhang to prevents upward rotation of the extension about the drop axis.

20. The patient support apparatus of claim **7** in which the table portion is positionable in a position intermediate the siderail position and the table position, the intermediate position being one in which the heel and extension are substantially coplanar with each other, a heel axis extends substantially laterally and a drop axis extends substantially longitudinally.

21. The patient support apparatus of claim **20** wherein when the table portion is in the intermediate position and the extension and the heel are in a coplanar relative orientation, the extension is rotatable about the drop axis but not about a swing axis.

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